ELECTRIC RAILWAY JOURNAL

Volume 44,
Number 25
Dec. 19, 1914

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Co., Inc.

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East Pittsburgh Pennsylvania

Member Society for Electrical Development. "Do It Electrically"

Electric Railway Journal

New York, December 19, 1914

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The Westinghouse Machine Co.
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East Pittsburgh, Pennsylvania.

Electric Railway Journal

Published by the McGraw Publishing Company, Inc.

Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLIV NEW YORK, SATURDAY, DECEMBER 19, 1914 No. 25

THE COMPANY'S SHARE IN SAFETY

To tell every employee the specific nature and exact cost of each safety installation is an unusual undertaking for a large property, but this is the policy that has been begun by the mechanical department of the Brooklyn Rapid Transit System. This policy is a logical step toward that employee's co-operation which has become a feature of the safety movement on smaller properties. The report of the B. R. T. mechanical department's safety committee, as quoted in the Electric Railway Journal of Dec. 12, declared that within three months the department had set aside more than $1,600 for such tangible items as machinery safeguards, hydraulic jacks and car-hoisting hooks. In addition, the men have been informed individually of other safety plans which are under way by the department. Further, they have been invited to suggest any additional betterments that they think feasible because of their specialized knowledge. On account of these conditions, the appeal to the men to do their share to avoid accident will meet with a heartier response than if the management had placed on them alone all the burden of watchfulness. As with other good causes, an ounce of sincere action is worth more in promoting safety than a pound of fine talk.

NEW JERSEY RATE DECISION

The decision of the highest court in New Jersey that an allowance must be made for the value of franchises in any public utility valuation for rate-making purposes accords with common sense. It seems difficult sometimes for the ordinary layman to understand the reason underlying this principle. He says: "The franchise originally cost the company nothing, and its only value has come from the growth of the community. The public should not have to pay increased rates because of this unearned increment." Just as fairly he might say that the men who took up land under the government homestead act thirty or forty years ago, developed the land and farmed it until it became valuable should receive no compensation for their property when it is taken for public purposes. The franchise, like the homestead, was not valuable until the occupant came and made it so. This possibility of a future increase in value was part of the consideration which induced the railway company to build its line, just as the grant of land under the homestead act induced the farmers to settle in the Far West, and it should be allowed just as definitely in one case as in the other. This point is clearly brought out in the decision of the Court of Errors and Appeals of New Jersey. The decision also cites cases where franchises are taxed in New Jersey and other cases where allowances have been made for franchises when water companies have been taken over for public use. Where this condition exists it is difficult to understand why a franchise should not also be considered as part of the property on which a company should be permitted to earn a return. We hope that the clear exposition of this entire subject by the New Jersey court will help to clarify public opinion on this important matter.

LETTERS TO THE EDITORS

One of the most important departments of a technical paper is that in which discussion among readers is carried on. Just as a technical meeting is most successful and interesting when the papers and reports produce discussion, so the use of a journal is most productive of the general viewpoint when some readers call the attention of others to important debatable or misunderstood topics through the communications column. When an engineer has a plan in mind for a movement which he would like to get started promptly he cannot do so, as a rule, through the appropriate national society because necessarily the machinery for this purpose is very elaborate and its operation is time-consuming. Through a "letter to the editor" of the technical journal reaching his field, however, he can quickly reach the eye of a large number of interested persons. Many ideas, not elaborate enough to warrant the preparation of extended articles, can be clothed appropriately in "communication" form. The author of such a communication is responsible for the accuracy of the assumptions which he makes and of the conclusions which he draws. While the editors endeavor to check statements of fact they cannot properly challenge assumptions and certainly not conclusions except in the editorial pages where they present their own opinions. The Electric Railway Journal is gratified by the interest shown in its correspondence section, as indicated by the increasing number of topics discussed therein, but still greater use should be made of this opportunity for interchange of the fruit of experience. Within the past few weeks letters have been printed on such diverse but relevant topics as operation of trains without train orders, the flagging rule, insert special-work failures, effect of wheel diameter on motors, indexing technical information, the truss-rod fallacy, economic limits of passenger haul, steel sheathing for car siding, advantages of the near-side stop, etc. Such letters ought to furnish an index to the vital problems of the hour. That such an index is desirable goes without saying, but the editors are dependent upon the readers to make it a success.

STANDARDIZING ELECTRIC RAILWAY FORMS

Different accounting problems and conditions for electric railways make an absolute uniformity of books and forms impossible and, even if this were not so, inadvisable. Yet this fact is no reason why individual books and forms commonly used by most railways or those used in interline accounting should not be made up with the goal of standardization ever in mind. Electric railways, and particularly electric railway accountants' associations, have already taken great strides toward this goal, but the result thus far has been confined to the attainment of that primary but not exclusively important feature, the standardization of copy or information desired and kept in accounting records.

As pointed out last week at the meeting of the Central Electric Railway Accountants' Association, however, other features of forms may be standardized, such as size, weight, color and quality of paper and style of ruling. These matters are more important than may be realized at first glance. Paper stock is made in standard sizes, and definite economies in printing cost can be secured if forms are cut to standard sizes so that waste will be avoided. The matter of weight is also important, for ledger papers, way bills, claim blanks, auditors' forms, car cards, etc., have to suffer varying degrees of usage, and not only should the weight be suited thereto but all the forms should be grouped by weight in order to effect the saving and greater purchase power secured by combination buying. Then, too, the proper choice of the quality in paper obviates the unending variation of manilas, bonds, fibers, etc., and also proves economical in press work and paper by making all printers bid on the same and best quality for each class of use. As to colors, the more in number and the more unusual in character the greater the first cost and the cost of matching. Lastly, except with extra large forms or small orders, standardized print rulings with a wax plate or standing form are preferable, making for a decrease in press cost and an expedition of deliveries.

Although all the above-named opportunities for standardization seem to have a more intimate connection with the printers' trade than with electric railway accounting, we believe that the securing of such ends is more properly the work of the accountants. In the first place, the latter already know the lettering to be used and its preferred arrangement, and it would be much easier for them to collect existing forms and standardize them along the suggested lines than for the printers to try to collect the forms, study their uses and induce the railways to use the ones decided upon. The success of such a standardization movement can only be secured when it is brought about by those most vitally interested in the tangible results, while the printers as manufacturers must be depended upon for their expert advice regarding the processes and materials used. In the second place, public accountants and systematizers have long since secured developments along these very lines. Every university school of commerce in teaching accounting theory and systems lays great stress upon a proper understanding by the accountant of the principles of printing that underly the make-up of forms, in order that the completed job may be secured with the greatest economy, fitness for peculiar usages, ease of replacement and adherence to standard practices.

In short, it seems to us that along this line electric railway accountants can make valuable and effective efforts to round out the excellent standardization work they have already accomplished. With the assistance of representative printers, they would surely lay a firm basis for the proper combination of standard accounting methods, decreased cost and easier inter-company accounting relations. In this connection, too, it would be well to remember the computing machines of various makes. The determination of the proper size and weight should be made with consideration for the way in which companies may desire to use the forms in such aids to efficiency and time saving. Finally, the yearly contract method of buying might be examined. With forms completely standardized, a railway could estimate the number of each class, contract for the immediate running of the whole and requisition sections from the printer during the year as needed. The advantage of competitive bidding would be retained, and economies would be secured in stores space, time in ordering and receiving goods, uniformity in supplies and fewer printers' accounts to handle.

HIGH-VOLTAGE INSULATOR PROBLEMS

The papers and discussion at last week's New York meeting of the American Institute of Electrical Engineers brought out clearly the facts that failure due to mechanical stresses is a large element in insulator depreciation; that the selection of the proper number of units in a suspension insulator is susceptible of mathematical analysis; that suspension insulators can be made partly puncture-proof by reducing the arc-over distance; that some kind of periodical test for insulators in situ is desirable, and that an altitude rating for insulators, high-tension bushings, etc., is a necessity.

This bill of particulars indicates some of the problems that are agitating the minds of electric transmission engineers. An insulator looks like such a simple construction, and the materials of which it is composed are, under ordinary conditions, so durable that a casual inspection would lead one to expect it to last for a long period unless punctured by an electric discharge or a hunter's bullet. Those on the inside tell us that insulator design is one of the most difficult arts, and this is substantiated in Mr. Austin's paper, abstracted elsewhere in this issue. Porcelain tends to absorb moisture and thus lose its electrical resistance; differences of temperature and chemical changes in the cement produce internal mechanical stresses; grooves on the porcelain surfaces and minute electrical discharges tend to start checking of the porcelain body, etc. When the condition of weather, the combined mechanical and electrical stresses to be resisted and the inaccessibility for inspection are considered it is remarkable that the depreciation of first-class insulators is as low as that of electrical machinery. That it is so was claimed at the Institute meeting, and the claim was not disputed.

A COMMON MISTAKE ABOUT TRANSFERS

A great many people are far too prone to judge the attitude of a street railway company toward the public by the number of transfers it issues. If a road makes a striking showing in the number of transfer passengers and thus obtains a low average rate of fare per passenger carried, it is looked on as rather beneficent in its attitude, while the system which issues a comparatively small number of transfers and shows a high earning per passenger carried is too often looked upon with suspicion and held up to entirely unjust criticism. As a matter of fact the proportion of passengers who ride on transfers has comparatively little significance unless one can ascertain that which no accounting system takes into reckoning, the real purpose of the transfer. A road may carry 5 per cent of its passengers on transfer slips and be almost needlessly generous to the public, or it may carry 30 per cent and confer no proportionate benefits.

Transfers are issued for two purposes, first, to give the public needed access to branch lines without payment of extra fare, and second, to avoid through routing of cars in a manner which may interfere with the best development of the traffic. In the former case the transfer may or may not mean an exceptionally long ride for a nickel. Often, too, actual physical transfer is made of which no definite record is kept, simply because such a plan is of more convenience to the riding public or perhaps to the road itself. We have in mind, for example, one small road in which there is near one end of the line a physical transfer of which no account is taken by reason of the particular circumstances in the case. The passengers get their full ride for a nickel, and the shift is made very promptly and easily, accommodating as it happens a large number of passengers. Now if transfer slips were issued in this particular instance the apparent fare per passenger of record would fall off and the road would seem to be liberal in transfers, whereas as a matter of fact it is saving the cost of the slips and making some other incidental savings without the slightest inconvenience to the public.

On the other hand, we can conceive of routes involving four or five transfers where the public would be better served by a larger number of through cars. Such a condition is apt to arise when changed conditions of business in a city alter the natural arteries of traffic. Under such circumstances, changes in routing should be made to accommodate the larger number of people, but a company, unaided by the municipality and a general public conception of facts, can rarely make these changes owing to the local opposition of merchants and others who are used to having certain popular lines of cars run past their doors.

When the uninformed layman tries to butt into a subject as technical in its details as is street railroading he will do well to drop that sublime confidence in statistics which characterizes the ignorant and find out the facts of the case before he makes any odious comparisons. In the cases cited, certainly, the facts are not shown on the face of the statistics. The truth as to whether the number of transfers given is adequate or not depends entirely on the way in which the transportation system really works out in practice and this can only be ascertained by intelligent physical study of the conditions. If people who write to the newspapers and complain to the commissions would "stop, look and listen" instead of rushing into print or litigation the world would be well rid of a good bit of unpleasant friction. Public utility companies have a reasonable claim to fair play which entitles them to careful investigation of the facts before critics jump at conclusions.

THE MERCURY RECTIFIER LOCOMOTIVE

The announcement that a mercury rectifier equipment with an output capacity of 1000 hp has made 20,000 miles and is in revenue service on a branch line of the New Haven Railroad deserves more than passing notice. It has been known for some months that the Westinghouse Company has been conducting experiments with the Cooper-Hewitt mercury vapor rectifier with a view to extending its use to traction work. The success of this type of rectifier in the storage-battery and arc lighting fields indicated what might be expected in traction work if a substantial container could be made which would withstand the shocks incident to locomotive operation, keeping the necessarily high vacuum and good electrical insulation. Glass bulbs are excellent for stationary work in moderate capacities, but they are obviously unsuited for heavy railway work. A steel shell is the ideal container from a mechanical standpoint, but its use involves difficult problems in the particulars mentioned above. That at least a measure of success has been attained in overcoming these difficulties is attested by the record.

The incentive to the development of the mercury rectifier is furnished by the desirability of securing the efficiency of power transmission of alternating current, the simplicity of a single-phase overhead system and the excellent operating characteristics of the d.c. series motor. If a simple single-phase rectifier or converter were available, and the present tests indicate that it soon may be, it will be possible to make a selection of a single-phase system which will best suit service conditions. There can then be used either the induction motor with the phase converter, as in the Norfolk & Western electrification, the compensated a.c. series motor, as in the New Haven system, or the new mercury vapor rectifier with standard d.c. motors. The competition between the d.c. and a.c. systems will then be keener and more interesting than ever, with a serious handicap to the latter removed.

Among the advantages which an a.c.-d.c. equipment may be expected to possess are high efficiency, good speed-regulating qualities, lightness, high power factor of input and independence of frequency. Continued tests will develop some compensating disadvantages as no one system can possess all virtues and no faults. The substantial fact, however, is that the equipment is operating satisfactorily, and it is to be expected that details of design and operation will be forthcoming shortly.

Electric Freight Service at Bangor

Development of Traffic on Thinly Populated Country Lines by Favorable Rates and Carefully Planned Service—Inauguration of Intensive Farming Under Company's Auspices

An interesting example of electric freight service developed from small beginnings to a profitable volume of traffic is afforded by the Charleston line of the Bangor (Maine) Railway & Electric Company. This branch of the system serves a purely agricultural district, the line being 25 miles long and having a tributary local population of about 2500. Under the executive direction of John R. Graham, president of the company, the revenue on this line has increased from gross earnings of $32,000 six years ago to a present income of $65,000, and the line now handles more than 50 per cent of the total electric freight business in the state. Co-operation with the farmers is the keynote of the company's policy, and the latest feature of the work is the establishment by the company of a model farm upon which the possibilities of intensive agriculture are being demonstrated for the benefit of the territory served by the line.

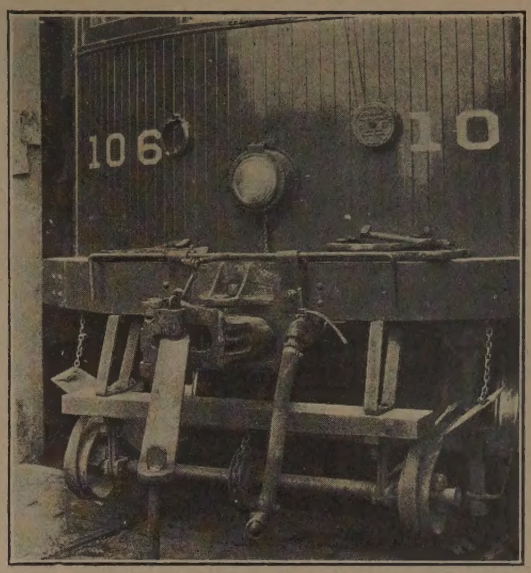
The line also serves the intermediate villages of Kenduskeag, 12 miles, and East Corinth, 18 miles from Bangor. Through passenger service is given in each direction on a two-hour headway, and hourly cars are operated between Bangor and Kenduskeag, in addition to the regular and extra freight service. Prior to the establishment of the present freight rates the line was losing about $25,000 per year. The present schedule was inaugurated by cutting the carload rate on potatoes 50 per cent. This reduction was extensively advertised in the local press and on posters in the cars. The present rate on potatoes and the shipments of potatoes during the past six years appear in Table I on the next page.

On other commodities the rates have been maintained substantially as at first, except that the rate on cordwood has been made especially favorable to the farmer. A few representative rates are given in Table II.

No house deliveries are made by the company. Shipments are frequently handled from platforms at the side of the track, as shown in two of the illustrations. These platforms are built of wood and in some cases are covered partially to protect the shipper and goods from the sun. A large amount of milk, cream and vegetables is shipped by the company daily into Bangor. On the regular return trip at 11:50 a. m. the company

BANGOR FREIGHT SERVICE—TYPICAL SHIPPING PLATFORMS

BANGOR FREIGHT SERVICE—POTATO FIELD AT COMPANY'S MODEL FARM. YIELD IS MUCH GREATER THAN ON OTHER FARMS IN VICINITY



BANGOR FREIGHT SERVICE—TYPICAL FREIGHT TRAIN, AND COUPLING AND AIR CONNECTION FOR FOREIGN CARS

handles farming implements, household supplies and miscellaneous freight. On week days a regular freight leaves Charleston at 6:30 a. m., East Corinth at 7 a. m., Kenduskeag at 8 a. m., arriving at Bangor at 9:30 at the company's freight depot, which is located on Front street, adjoining the wharf of the Eastern Steamship Corporation and having spur track connections with the Maine Central Railroad.

TABLE I—DATA ON RATES AND AMOUNTS OF POTATOES SHIPPED

	Carload Shipments to Bangor		
	Kenduskeag	East Corinth	Charleston
700 bushels	$11.89	$15.40	$19.60
800 bushels	13.59	17.60	22.40
Base rate per bushel for all carload lots, 500 bushels, minimum carload	1.7 cents	2.2 cents	2.8 cents

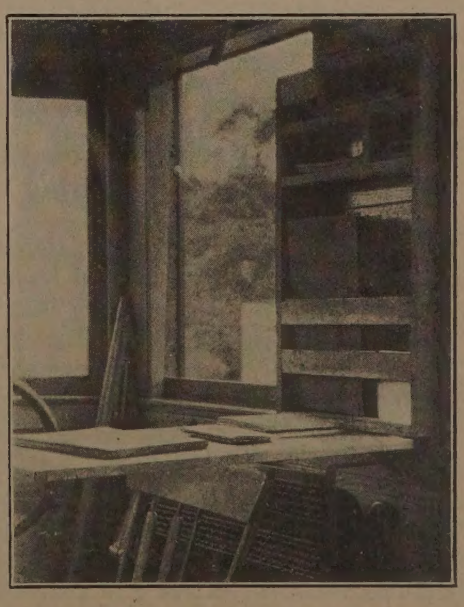
Season	Car Loads Potatoes
1907-1908	81
1908-1909	161
1909-1910	340
1910-1911	436
1911-1912	276
1912-1913	438
Total	1732

TABLE II—TYPICAL RATES CHARLESTON LINE

	Between Bangor and		
	Kenduskeag	East Corinth	Charleston
Pulpwood, per hundredweight	$0.0257	$0.0285	$0.0314
Cordwood, per cord	.75	.90	1.00
Fertilizer, per ton	1.00	1.30	1.60
Grain, per ton	1.00	1.30	1.60
Hay and straw, per ton	1.00	1.10	1.30
Groceries, less than 500 lb., per hundredweight	0.08	0.11	0.12
Berries, per small crate	0.15	0.20	0.25
Berries, per large crate	0.20	0.25	0.30
Horses, cattle, etc., less than carlot	2.75	3.30	3.85
Eggs, per case (56 doz.)	0.20	0.25	0.28

MODEL FARM

The model farm is 6 miles from Bangor and last season 40 acres were under cultivation, 30 acres being devoted to potatoes. The company finances the enterprise, which is operated by an expert agriculturist who is on the staff of the University of Maine. The average yield of potatoes in Maine is 200 bushels per acre, and the model farm is being run with the expectation of obtaining 400 bushels. One of the potato fields, which has been developed by the use of phosphates costing $35 per ton, is illustrated. Experiments are also being made with lime. The size of the plants and blossoms indicates the merits of intensive farming, when these are compared with others in the Bangor region farmed according to the old methods. In the summer the company holds farmers' meetings on the model farm, lestures and inspection of exhibits. In this way the farmers in the neighborhood have an opportunity to study at first hand the latest methods employed in scientific farming as well as to inspect the most modern



BANGOR FREIGHT SERVICE—FREIGHT STATION AT BANGOR AND FREIGHT RECORD DESK ON LOCOMOTIVE

sanitary appliances and electrically operated labor saving devices.

Freight Equipment and Power Supply

The company owns ten box and ten flat cars, and a considerable part of its traffic consists in switching and hauling foreign freight cars to and from the Maine Central Railroad. Three combination express cars and electric locomotives are in service. Each locomotive is equipped with four G.E.-80 motors, K-28 control and straight air brakes. Each is capable of hauling four loaded box cars at a speed of 15 m.p.h. The latest equipment of this type, which was built by the Wason Manufacturing Company, Brightwood, Mass., is 34 ft. 6 in. long and 8 ft. wide inside, with side doors 5 ft. wide and 6 ft. 4 in. high. The car is equipped for double-end operation and weighs complete 24 tons. The door sills are of corrugated iron 6 in. wide. Nine 16-cp lamps furnish the interior illumination, and both luminous arc and incandescent headlights are installed. To facilitate handling foreign cars a coupler and intermediate air hose are provided. Two men handle the locomotive car and all trailers. A convenient home-made desk used on the car illustrated on page 1329. This is made of a box 4 in. deep, 18 in. wide and 30 in. high attached to the car siding and provided with a hinged cover with a leg at the outer end. The cover is at a height of 3 ft. 4 in. above the floor, and the box, which is of ½-in. stock, is divided into five compartments, the lower slats being provided with pencil grooves.

In March, 1914, the company handled 5022 tons of freight, its freight cars being operated 13,318 car miles. The motor cars made 4886 miles, and trailers 8432. The earnings of the freight department were $4,739, an increase of 17 per cent over March, 1913. Of this revenue, $1,002 came from way freight in less than carload lots, the balance being from handling cars in bulk. A substantial shifting service on the Hampden line of the company is included in the above revenue producers. The maximum grade on the Charleston line is 8 per cent, and the most difficult combination of grade and curve is in the city of Bangor, where the trains are operated around a 72-ft. radius curve on a 5 per cent incline.

Power for the operation of the Charleston line was formerly supplied by an inefficient steam plant at an expense of $18,000 per year. When the Graham interests took hold of the property the plant was shut down and later converted into a potato storage depot. The hydroelectric system of the Bangor company supplies power to the Charleston line at an almost insignificant cost, since the number of motor cars in service at any one time rarely exceeds six. Howard Brett is general freight agent and M. E. McCormick general manager of the company.

New York State Commission on Ventilation

Report of First Year's Experiments—High Temperatures Have Marked Physiological Effect—Vitiated Air of Little Influence

The New York State Commission on Ventilation, of which C. E. A. Winslow is chairman and G. T. Palmer is chief of investigating staff, has given out some of the results obtained in a series of experiments carried out during the past year. These were conducted in observation rooms at the College of the City of New York where the effect on human beings of air of various temperatures, humidities and chemical conditions was investigated in detail. The observations were made under circumstances not extreme in character, as in the case of most past investigations, but were designed to be comparable to conditions existing in occupied rooms, the maximum test temperature being 86 deg. Fahr. with 80 per cent humidity, and the minimum being 70 deg. Fahr. with humidities of 50 per cent and 60 per cent. Fans were used for agitating the air in some cases, but their influence appeared to be negligible on both the mental and physical condition of the subjects. There were no experiments with the use of agitating fans in a vitiated atmosphere.

Summed up, the results of the first year's work seem to have established that a very high temperature, such as 86 deg. Fahr. with 80 per cent relative humidity, produces slight but distinct elevation of body temperature, and an increase in heart rate. A moderately high room temperature, 75 per cent with 50 per cent relative humidity, has the same effect, although, of course, in less degree than the extreme temperature condition.

The extreme room temperature of 86 per cent with 80 per cent relative humidity showed no effect upon respiration, dead space in the lungs, acidosis of the blood, rate of heat production, or rate of digestion. Nor is the power to do either mental or physical work, when actually working in a concentrated fashion, diminished at all by a room temperature of 86 deg. with 80 per cent relative humidity.

On the other hand, the inclination to do physical work is certainly diminished and the inclination to do mental work is probably diminished by high room temperatures. So far as physical work is concerned the tests showed a decrease in actual work performed (when the subject was given his choice of working or idling) of 15 per cent under the 75-deg. temperature and of 37 per cent under the 86-deg. temperature as compared in each case with 68 deg.

Stagnant air at the same temperature as fresh air, even when it contains twenty or more parts of carbon dioxide and all the organic and other substances in the breathed air of occupied rooms, has no effect on any of the physiological responses nor on the power nor inclination to do physical or mental work nor on the sensations of comfort of the subjects breathing it. On the other hand, the appetite for food of subjects exposed to such stagnant air is slightly but distinctly reduced, perhaps as a result of a subconscious effect of odors.

These experiments seem to indicate that overheated rooms are not only uncomfortable but produce well-marked effects upon the heat regulating and circulatory systems of the body and materially reduce the work done by the occupants when they are free to work or not as they choose. The most important effects of "bad air" are due to the increased temperature, and the results shown with even a slightly elevated room temperature, such as 75 deg. Fahr., are sufficiently clear and important to warrant careful precautions against overheating.

The chemical changes in the breathed air of occupied rooms are of comparatively minor importance, but the substances present in such air appear to exert one definite measurable effect, a decrease in the appetite for food, and this constitutes an observation which, for the first time, offers scientific evidence in favor of fresh air as compared with stagnant air of the same temperature and humidity.

The work of making the existing double-track line from Tokio to Yokohama, Japan, into a four-track line has been practically finished. The old track will continue as a steam line, while the new track will be used for electric service. Electric cars will run from the new Tokio central station.

Valuation of Franchises

New Jersey Court of Errors and Appeals Holds that Value of Franchises Must Be Considered in Public Utility Rate-Making—Passaic 90-Cent Gas Ruling Reversed

An important decision was handed down last week by the Court of Errors and Appeals of New Jersey, in the case of Public Service Gas Company vs. Board of Public Utility Commissioners et al. A short statement of the decision was published on page 1311 of last week's issue. The syllabus of the decision, written by the court follows:

"When a public utility corporation is in the enjoyment of privileges to use streets and public places in this State for the purposes of its business, whether such privileges be conferred by the State alone or partly by the State and partly by the municipality and whether they be exclusive or subject to duplication such privileges constitute a special franchise, which is property, is subject to taxation and has normally a substantial value; and in making a valuation of the property of such corporation for the purpose of establishing a basis for the regulation of rates to be paid to it by the public for its product or service, it is erroneous to assign no value, or a merely nominal value, to such franchise when a substantial value is fairly reflected in the total market value of its securities."

In the decision, which was delivered by Judge Parker, the court concurs with the Public Utility Commission and the Supreme Court in holding that 8 per cent upon the true value of the company's property is a fair and lawful rate of income in determining the price to be charged consumers. The only real point of difference, therefore, hinged upon how this true value should be determined, and primarily upon whether a nominal or substantial value should be given to the special franchise. In discussing this point the court said, in part:

Allowance for Franchise Value

"This brings us to the other main element of value, called by the commission the total value of all the intangible property of the company, and which the board estimated at 30 per cent of the valuation assigned by them to the structural plant. This, as the board expressly stated, included everything outside of the tangible property and associated plant assets, such as working capital. They expressly included preliminary outlay, such as engineering and legal expenses, canvassing, costs of incorporation, cost of securing franchises, financing, bankers' commission, deficit in operation during the earlier years, and inadequate early returns upon the investment; also 'the entire value of all franchises, primary or secondary, possessed or exercised by the company in the Passaic division.' Two or three other specific intangible elements were included that need no notice here. Nothing was allowed for good-will.

"In discussing the matter of franchises, the commission remarked that its finding as to the total amount of intangible property was 'tantamount to including the franchises of the company at a moderate rating, at a value comparable to the cost of obtaining these or similar franchise. It amounts, therefore, say the commissioners, 'to a practical denial of the company's contentions as to the value of its franchises.'

"The board stated that it is the public policy of the State not to allow the capitalization of franchises for an amount in excess of the actual cost involved in obtaining said franchises; evidently referring to paragraph F of Section 18 of the utilities act, P. L. 1911, page 381. We find difficulty in ascertaining from the report the method adopted by the commissioners for valuation of the franchises. In one place they announce that such value is included in the 30 per cent estimate of all the intangible property; in other places they say that there is no evidence before them to show that these franchises should be valued at any more than the cost of obtaining them; in their general summary of valuations the franchises are listed as an item and no value assigned thereto, and the next item consists of patent rights, which the commission expressly declares to have no value whatever; and yet the commission conceded that special franchises are property; that when tangible property is operated under franchise rights the instrument of public service is worth more than the material and labor involved in its construction; that taxation is imposed in respect of special charters as 'property' in this and other States; and that neither franchise nor any other property can be taken for public use without just compensation.

Have a Substantial Worth

"These are extracts from the report in its exact language. In dealing with this question the Supreme Court seems to have gone a step further, for it held that 'logically no allowance should be made for the value of the special franchises in a case where it is not legally exclusive, and where the State still retains the right to fix rates.' 84 N. J. L. 482.

"We find ourselves unable to concur in this result. Without adopting in its entirety the rule laid down in our railroad tax cases, that the total valuation of the property and franchises should be gaged by the market value of the outstanding corporate securities plus floating debt, and that therefore the value of the franchises would be indicated by the difference between this total and the sum of the value of the physical plant, plus development cost; and conceding that in most of the cases of public utilities the privilege of utilizing the public domain is not exclusive, and is therefore subject to invasion by other similar utilities, and conceding also that charters and local franchises are often granted by the State or the municipality, without a cash or property consideration, the conviction still remains that such franchises have substantial value.

"We often hear of old charters being bought up for use by new enterprises. The very charter of the appellant seems to be one of this class. It seems a fallacy to say that if and because a municipality confers upon a gas company or a street railway company the privilege of using the public streets without any consideration in cash or property passing from the company, the rights thereby conferred should have no value for rate-making purposes; for this disregards at least the meritorious consideration that the promoters of the company have invested their money and given their time and taken their business risks in view of the making of this very concession, and the value of the enterprise on which the owners are entitled to draw an income should not be limited to the mere cash that they have put into it, but should include something for the risk and responsibility that they have taken in organizing and developing it.

"It is true, as the board remarked, that the utilities act forbids the capitalization of franchises. This prohibition, however, refers to the inclusion of a franchise valuation in the par value of capital stock, but does not affect its market value. Just as the value of a bank stock may be and often is legitimately enhanced by public confidence in the directors of a bank and the methods of its business management, Newark vs Tunis, 81 L. 45; 82 L. 461; so the market value of the securities of a public utility may be enhanced in part at least by the fact that it is operating under a municipal franchise costing little or nothing in cash outlay, subject, it may be, to duplication, but which the public has the right to suppose in a proper case will follow the general run of such franchises and be free from indiscriminate competition although not legally exclusive. Such a situation would be a legitimate element of market value and would be taxable, as reasonably and fairly enhancing the value of the property in the public mind. It would thus be capitalized, not by the utility itself but by the public as a business matter, and against such capitalization there is no prohibition, legislative or otherwise."

Taxation Emphasizes Worth

The court here presented a long list of citations to confirm this view. It then points out that the status of franchises as property is emphasized by the provisions made by the Legislature for taxing them and the deliverances of the courts in tax cases and says, in part:

"It should be unnecessary to remark that our reports would not contain this long line of decisions in earnestly litigated franchise tax cases, were it not a fact that franchises, general or local, State or municipal, have a substantial value of which the taxing authorities are prompt to take advantage, and which value in tax assessment controversies, the authorities estimate often in large figures. If other evidence of substantial value were needed, it may be found in the fact that as to municipal franchises, the municipality may impose within reason, and the utility must comply with, conditions involving considerable expense. J. C. & H. R. R. Co. vs. J. C. & B. R. R. Co., 21 Eq., 550.

"The respondents then must take and sustain this position: That although by numerous decisions of the Supreme Court, Court of Chancery, and of this court, it has been repeatedly declared that the privilege given to public utility corporations, either directly by the State, or partly by the State and partly by the municipality as a State agency, and whether exclusive or not, is a franchise, and as a franchise is property, to which the utility in a proper case may assert its special right as against an usurper, and as property is subject to taxation, at the will of the Legislature, upon a substantial valuation fixed by the taxing authorities; and though its bestowal may be and in most cases is conditioned upon a substantial, valuable consideration in money or contract obligation, yet when in the exercise of its rate regulating power the Legislature deputes an agency to determine a valuation as a basis for the rate, such agency may disregard the unquestionable value that is attached to the franchise for the purpose of yielding an income to the State or its subdivisions, and declare that such franchise has only a nominal value for the purpose of yielding an income to the public utility.

"We cannot agree to such a proposition. We are aware that some courts have held that a valuation for taxation is not necessarily identical with valuation for rate regulation. This may be so in a measure. Indeed, it is readily conceivable that if the franchise were exempt, as it was claimed to be under the act of 1903 (North Jersey Street Railway Company vs. Jersey City, supra) the rate valuation might exceed the tax valuation by the value of the franchise.

"But normally, when all the corporate property is subject to taxation and also valued for rate regulation, it would seem reasonable to say that the owner of the property is entitled to a fair income on property for which it is taxed. The fact that the State or the municipality, or both, have seen fit to confer a franchise in many cases as a gift (so-called) or for a consideration deemed inadequate in view of the advantages conferred, does not, as it seems to us, create any implication in the grant that the value of the franchise should be disregarded in fixing a reasonable rate.

Franchises Based on a Consideration

"Recurring to the argument that these special or municipal franchises are given to the utility, or contributed by the public, and therefore should not be estimated in fixing a rate, we repeat that the minor premise is an unwarranted assumption of fact. A municipality desires street car or gas service. It can, if so authorized by the Legislature, build and operate its own plant and equipment. Perhaps the cost of installation is too great, so that there would be no sale for the bonds, or the citizens are unwilling to shoulder the interest charge; perhaps, also, the usual extravagance in operation due to public ownership is a deterrent. It is common knowledge that in this country a public utility is usually operated by the public at a loss or an inadequate return.

"The economic advantage of private ownership is generally recognized. In this situation, a company is organized and asks a franchise. The risk is all that of the organizers; nothing is risked by the municipality. If it fails, they lose their money. It must operate, however, so long as it does operate, at a reasonable rate, based on a theoretically economical plant and operating expense. It cannot charge the public more than the service is worth, just because otherwise it will not meet its operating expenses and fixed charges. It must pay its taxes, whether it earns them or not. In short, all such franchises are based on a consideration, viz., the risk and obligation undertaken by their grantees; and it will not do to say that the franchise is a public contribution exclusively.

"If the plant and franchise be taken over by the public, the franchise must be paid for like any other property. Monongahela Nav. Co. vs. U. S. 148, U. S. 312; Brunswick and Topsham Water Dist. vs. Maine Water Co., 99 Me. 371, 59 Atl. 537. In the latter case the Legislature expressly recognized that it should be paid for, but the court did not rest on that; on the contrary, it said that even in cases where by statute franchises were not to be included in the valuation, the court conceived that it must have been implied that the property was to be valued as rightfully where it was, and rightfully to be used; adding that the right to use and charge reasonable tolls were the franchises, at any rate the most important ones.

"If, as we think is the law, substantial allowance should be made for the franchise of a gas plant if taken for public use, and the value of such franchise paid in money to the owners thereof, we fail to see why, so long as the plant and franchise possessing that value for sale or condemnation are held and operated by the owners, the latter should not be entitled to a reasonable income on all elements of their property, including the franchise, in the absence of any charter reservation or contract to the contrary. As was said by the Supreme Court of Maine, in the Brunswick case, ubi supra, 'we

apprehend that some difficulty in discussion has arisen from attempting to differentiate in logic what is inseparable in fact. The property taken is a single thing, to which belong certain characteristics which affect its value.'

"We do not wish to be understood as laying down the doctrine that the value of the franchise is to be measured necessarily by the total market value of outstanding capital stock and indebtedness, less physical valuation and development cost, because this would take no account of inflation of stock values; but if such market value added to indebtedness show an excess, such excess is at least evidential that where there are special franchises such franchises have some substantial value in excess of the mere outlays for legal, advertising and other legitimate expenses in obtaining them. This element was, apparently, expressly excluded both by the commission and by the Supreme Court. This exclusion, in our opinion, was error. We think there was evidence before the commission to indicate that from this standpoint the franchises had a substantial value which the commission refused to give to them, and as the 90-cent rate fixed by the commission was based on the theory of providing net income of 8 per cent of the total value of the property of the company, the finding of fact that such rate was just and reasonable was in direct violation of the fundamental theory on which the commission undertook to fix the rate, and is presumably not justified by it. On the appeal of the gas company, therefore, the judgment of the Supreme Court will be reversed and the order fixing the 90-cent rate will be set aside."

The opinion was delivered by Judge Parker. Five other judges concurred in it. Four judges voted to affirm the decision of the Supreme Court.

Rapid Handling of Auto Bodies on the Detroit United Railway

BY N. RUMNEY, TRAVELING FREIGHT AND EXPRESS AGENT DETROIT UNITED LINES

In Detroit, Mich., the movement of carload freight within the central district is entirely out of the question, and any business of this character must necessarily be confined to the outer districts. There are, however, a large number of factories located in the outlying sections engaged in the manufacture of various articles and part of the output of these factories is forwarded to customers in adjoining cities. Some of this material includes automobile parts, and the manufacturer is usually under contract to deliver a specified quantity of the material daily. This is difficult with the service afforded by the steam railroads in some cases, because of the delays en route and the unreliability of the service.

The accompanying illustration shows how automobile bodies are handled by the Detroit United Railway on flat cars equipped with stakes and railings. These bodies are shipped by automobile body companies of Detroit to one motor company at Flint, Mich., a distance of 70 miles, and to another motor car company at Pontiac, Mich., a distance of 25 miles. The bodies are 10 ft. 2 in. long and are set upon end, eighteen bodies being loaded upon a 34-ft. car. In transit the bodies are covered with a large canvas which, after the car is unloaded, is folded and placed in a side-hinged box provided for that purpose beneath the car.

During the busy automobile season it is a vital problem to secure material with sufficient regularity, for any interruption in the daily supply of any one of the numerous parts which enter into the make-up of the completed automobile may mean a serious setback, if not an actual money loss. So in this case the Detroit United Railway is relied upon to secure the prompt delivery of bodies, despite the fact that trucking is necessary at both the point of receipt and delivery, whereas the steam railroad could make complete delivery. These cars are loaded at Detroit during the day and are placed at the destination ready for unloading before 6:30 a. m. the following day.

The rate for transportation exceeds that charged by the steam railroads. The shippers, however, consider that this higher rate is more than offset by the advantage gained in having the goods on hand when required, thus enabling them to have the bodies well advanced in the process of painting and finishing before they would have been received in the ordinary course of steam railroad freight movement. To the shippers, another advantage lies in the fact that they are permitted to continue loading until a late hour in the afternoon or evening, thereby making it possible to ship the entire day's output at the close of the day's work. This increased efficiency enables the manufacturer to make contract deliveries even during the busiest part of the season.

VIEW OF CAR OF AUTO BODIES BEFORE COVERING THEM WITH TARPAULIN; ALSO AN EMPTY CAR

Annual Meeting of C. E. R. A. Accountants

Report of Proceedings of This Meeting in Dayton, Ohio, on Dec. 11 and 12, with Abstracts of Committee Reports and Papers—Depreciation of Equipment and Cost Accounting Main Topics

The twenty-sixth annual meeting of the Central Electric Railway Accountants' Association was held on Dec. 11 and 12 in the Hotel Beckel, Dayton, Ohio. After a meeting of the executive committee the opening session was called to order on Friday afternoon at 2:30 o'clock by the president, L. T. Hixson, auditor Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind. The minutes of the mid-year meeting in Toledo were read and approved, and the delegates then accepted with thanks an invitation from John F. Ohmer, president Ohmer Fare Register Company, to join him at dinner at the Dayton Club. The address by President Hixson, abstracted elsewhere in this issue, followed. The executive committee reported with recommendations that F. S. Kelser, Mansfield Railway, Light & Power Company, Mansfield, Ohio; F. J. Haas, secretary Public Utilities Company, Evansville, Ind., and H. Armstrong, Steubenville & East Liverpool Railway & Light Company, East Liverpool, Ohio, be admitted to membership; that A. F. Elkins, auditor Columbus, Delaware & Marion Railway, Columbus, Ohio, be elected as honorary member, and that the printed list of membership of the association hereafter include only active members. These recommendations were all adopted.

Reports of Committees on Accounts

After the report of the treasurer, the reports of special committees were taken up. E. L. Kasemeier, auditor Ohio Electric Railway, Springfield, Ohio, chairman of the standing committee on freight accounts, presented two new paragraphs for addition under Section 4—way-bill corrections—as follows:

"When originating agent gives shipper prepaid bill of lading, but way-bills show shipment collect, agent at destination will deliver shipment without collection of charges, if consignee refuses to pay and turns over to destination agent the prepaid bill of lading. (Destination agent will ask originating agent to issue correction on billing.)

"When originating agent gives shipper collect bill of lading, but way-bills shipment prepaid, agent at destination should accept correction on billing, even though shipment has already been delivered as prepaid. (In event, however, he cannot make collection from consignee, he may so notify his auditor, who will take up with auditor of billing company for request of billing agent to make effort to collect from shipper. If collection cannot be made from shipper, destination road will be so advised.)"

Upon the discussion of this recommendation, however, the second paragraph was changed to relieve the destination road of liability as follows:

"When originating agent gives shipper collect bill of lading but way-bills shipment prepaid, agent at destination should endeavor to collect and if successful accept correction. If collection cannot be made, the correction should be denied."

The two paragraphs were then adopted by the delegates.

Mr. Kasemeier's committee further recommended that the association should print in pamphlet form the recommendations for handling interline freight accounts on paper cut to tariff size (8 in. x 10 in.), printing to be done on one side only and the copies to be disposed of at cost to railways by the secretary. This recommendation was also adopted. Mr. Kasemeier suggested that on account of the growing use of way-billing typewriters and the fact that some machines could accommodate way-bills only 8½ in. wide, it might be advisable for the association to recommend a form of interline way-bill of different size than at present so that such bills could be made out on small carriage machines. Upon motion by Walter Shroyer, auditor Union Traction Company of Indiana, Anderson, Ind., this matter was referred to the committee for further consideration. In regard to the matter of interchanging freight trailers, the committee recommended that the association adopt the recommendation of the Central Electric Railway Association as outlined in its bulletin 71, Brown Book 4, pages 10 to 14. This method provides for a report to be made by the junction agent to the auditor of the road owning the car with a copy of the report to the auditor of his own road, the report to show car initial and number, loaded or empty state, road to which delivered, exact hour and minute, and date. It was felt that such information would enable the owning road to make a proper bill against the using road. The recommendation was adopted.

In connection with his report, Mr. Kasemeier recalled that at the last meeting the committee was asked to prepare a resolution that "order notify" shipments be discontinued. The committee had not acted on this point, however, and a discussion was requested. Mr. Shroyer moved that before taking definite action the committee should write to different companies to find out how they handle such shipments and whether they object to receiving them, which was duly carried.

The report of the standing committee on passenger accounts was presented by Mr. Shroyer, chairman, who said that on account of a lack of questions submitted a report was unnecessary. He approved the combination of the standing committee on freight accounts and the standing committee on passenger accounts, and a motion to this effect by him was seconded by Mr. Kasemeier and carried.

Query Box Report

The next order of business was the report of the query box committee, read by T. P. Kilfoyle, auditor Cleveland (Ohio) Railway, chairman. Four questions were submitted, the first of which had reference to what constitutes cash discount. To start the discussion Mr. Kilfoyle stated that anything above 3 per cent might be considered a trade discount. W. H. Forse, secretary and treasurer Union Traction Company of Indiana, Anderson, Ind., cited some examples of cash discounts running as high as 30 per cent, and Mr. Kasemeier stated that cash discount was discount received for prompt payment within ten, twenty or thirty days. Mr. Loftus said that in a recent case he refused to pass anything more than 2 per cent for ten days as a cash discount. Mr. Kilfoyle remarked that in Ohio cash discounts must be considered in the basis for the income tax. Large discounts should be considered as trade discounts, showing the possession of good purchasing qualities. According to President Hixson's definition, cash discount is a sum allowed for prompt payment, which amount is made up on a basis equal to the current charge for use of money.

In regard to the question whether it is proper to transfer any amount of sinking fund reserve to surplus

after the bonds have been purchased and canceled, Mr. Kasemeier stated that if all the bonds have been retired any balance in the sinking fund reserve could be so transferred. President Hixson mentioned a $50,000 bond issue with $25,000 of the bonds retired from time to time through the sinking fund and the remaining $25,000 taken care of through a refunding issue. In this case the $25,000 of sinking fund reserve offsetting the sinking fund cash used to buy the bonds should not be retired without notation to surplus but should be ear-marked to show that the cash represented by this section of surplus had been spent. In this connection Mr. Forse stated in general that he was opposed to the splitting up of surplus into parts for dividends, sinking fund, depreciation, etc.

The next question dealt with the proper entry in making payment of bond interest when a portion of the company's bonds is held by the sinking fund trustee for the benefit of the company. President Hixson said that the new Interstate Commerce Commission classification provides that the account for interest on funded debt shall not include charges for interest on funded debt obligations issued or assumed by the company and owned by it, whether held in its treasury, special deposits, sinking or other reserve fund, or pledged as collateral. He also quoted from the accounts dealing with the appropriation of surplus to sinking fund and other reserves, sinking fund and sinking fund reserve, to show that interest on bonds held in sinking funds cannot be shown as a deduction from income. In such cases the debits would be to bond interest deductions for interest as bonds in the hands of the public only, and to sinking fund for interest on bonds which are held by the trustee and on which the trustee collects the coupons. The credit would be to cash for the interest on the full amount of the uncanceled bond issue. The next entry would be to debit surplus account 309—appropriation of surplus to sinking fund and other reserves—and credit sinking fund reserve for the amount of surplus representing the income accretion to the sinking fund during the period. Mr. Kilfoyle said that the Cleveland Railway has an interest fund of $500,000 created by ordinance, $300,000 of which is invested in the company's own stock. Each interest period the company pays directly to the interest fund 6 per cent.

The last question was as follows:—In reporting net income to the internal revenue collector, should the amount of discount on bonds purchased by the sinking fund trustee be included as income? Mr. Forse said that Interstate Commerce Commission account 306—profit and loss, miscellaneous credits—would show the proper provision to be made for such amounts.

At this point Mr. Forse called attention to the first ruling covering the reporting of deductions of bond interest in stating income. The first ruling provided for taking the entire capital stock and entire bonded indebtedness and dividing the total by two to secure a base for interest. The second ruling, however, was more favorable to most companies, inasmuch as they were allowed to take the entire bonded debt and half the capital stock as the base. Mr. Forse said that more than $800 had been returned to his company as a result of this second ruling and that it was worth following up by all companies.

President Hixson read a letter from H. J. Davies, secretary Cleveland (Ohio) Railway, to the effect that the Treasury Department in connection with the income tax on corporations had ruled that the gain or loss resulting from the sale of capital assets acquired before Jan. 1, 1909, was to be increased or decreased accordingly as there was gain or loss by the amount of depreciation charged off since Jan. 1, 1909, and not used to make good depreciation. This ruling as regards depreciation applied only to such tangible properties as were subject to wear and tear, exhaustion and obsolescence.

COMMITTEE TO CONFER WITH C. E. R. A.

The committee to confer with the Central Electric Railway Association reported through Mr. Kilfoyle, chairman, that the joint committee appointed to confer on the differences existing between the Central Electric Railway Association and the Central Electric Railway Accountants' Association had submitted a report to the executive committee of the former association at a meeting at Fort Wayne on Nov. 19, which was adopted. This report stated that a necessity was found for handling more properly the obligations incurred by the Accountants' Association, and it was recommended that an annual appropriation of $150 be made from the general fund, any unexpended balance to be returned to the general treasurer by the Accountants' Association and no obligation exceeding that amount to be incurred unless authorized in advance by the executive committee of the Central Electric Railway Association. Upon motion by Mr. Cavanaugh, this report was adopted by the Accountants' Association.

A telegram was received from C. S. Mitchell, comptroller Beaver Valley Traction Company, Pittsburgh, Pa., expressing his regret that he was unable to attend the meeting as scheduled. A representative of a Central printing house was given the privilege of the floor to state that his firm is trying to standardize railway accounting forms as to size, quality of paper, style of ruling, etc., the object being the attainment of a large reduction in printing cost. President Hixson appointed Messrs. Shroyer, Kilfoyle and Kasemeier as the nominating committee and the meeting was then adjourned.

SATURDAY'S SESSION

The first order of business on Saturday morning was the presentation of a paper on "Cost Accounting In a Manufacturing Plant" by G. D. Piper, director of works accounting Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa. This paper is abstracted elsewhere in this issue. In explaining the systems of wage payments used by his company Mr. Piper said that the company uses four different systems, namely, day work, piece work, premium and bonus. The premium or Halsey system is based on time. A definite time is fixed for the completion of a certain job by the average workman, to which is added a premium of from 30 to 60 per cent of the time. The workmen are paid for one-half of the time saved below the total on each job. The bonus plan is also based on time, but without the incentive of a premium being added to the base or net time. If the workman completes the work any time within the time limit, a flat bonus of 30 per cent on the day's wages is paid, but all jobs during the day must have been produced within the time limits. The base rates are set by a group of men independent of the foreman and under the direction of one of the staff. The bonus system is more generally used with jobs of short duration, while the premium plan is used in the main works in productive labor. Mr. Piper stated that the losses due to abnormal conditions are charged directly against income and are not used to inflate costs. Mr. Forse recommended that sets of forms furnished by Mr. Piper should be distributed among the absent members. A vote of thanks was rendered to Mr. Piper.

DISCUSSION ON DEPRECIATION OF EQUIPMENT

H. J. Davies was unable to be present for his address and the attention of the meeting was turned to a gen-

eral discussion on the basis and the methods of accounting for depreciation on equipment. Mr. Forse opened the discussion by reading the Interstate Commerce Commission requirements on this point. He stated that the Boston & Maine Railroad within the last decade had charged off almost 4 per cent of the book value of its rolling stock, while the New York Central lines charged off 2 per cent per annum for freight car depreciation, and the New York, New Haven & Hartford Railroad only this year inaugurated a regular charge of 2 per cent. At the present time the Pennsylvania Railroad charges depreciation at the rate of 4 per cent of the original cost of locomotives and passenger cars and 3 per cent on freight cars. Other figures given were as follows:—European cars, 1.7 per cent per annum; British Columbia Electric Railway, 3.5 per cent; Stone & Webster testimony in Chicago Union Traction case, 5 per cent; testimony in Milwaukeee 3-cent fare case, 7½ per cent; average Scotch practice, 7½ per cent, and average English practice, 10 per cent. The above figures, according to Mr. Forse, show clearly the variation in practices and the estimated life of equipment, the latter ranging from ten to fifty-nine years. In his opinion accounting for depreciation must depend upon the policy of the individual company regarding upkeep and renewals. One company is providing for maintenance and renewals at a rate sufficient to pay for the rolling stock in nine years. Under such conditions it is inconceivable that some depreciation is not taken care of through such a process. Mr. Forse stated emphatically that if a car has passed one-half of its estimated life it is by no means proved that it has depreciated one-half. In the present Detroit valuation case the state engineers desired to write off depreciation on a 17-year-old car, but when the company tore the car down for inspection the posts, sills and general fittings were found to be in the best of condition.

Mr. Forse quoted from the editorial in the Electric Railway Journal of March 21, 1914, to show the conflict in commission rulings as regards the distinction between the treatment of maintenance and depreciation charges. He also noted conflicts in commission ruling where the question of valuation was involved, such as in the recent Manchester fare decision, the famous Kansas City Southern case and the recent Middlesex & Boston rate decision.

Mr. Forse said that the committee on standard classification of accounts recently received a letter asking whether the carriers had a right to figure depreciation on any other basis than the cost or purchase price—for instance, whether it could be calculated at a rate of 2½ cents per car-mile or 7 per cent of the gross earnings. The commission in answering this query said that depreciation may only be accrued as a percentage of the original cost. Mr. Forse objected to setting up each month an amount based on the book cost of the equipment, on account of conflicting tabulation experiences on the subject and on account of general lack of knowledge regarding it. He believed that companies should be permitted to charge off a lump sum based on experience, or a percentage of net earnings based on financial ability, or an amount per car-mile based on experience. Companies should be chary in setting up large amounts for depreciation on account of possible ultimate valuations, for the increased value of properties through terminals, rights of way, solidification of roadbed, as well as other intangible values, may not be allowed, and the valuation engineer will deduct depreciation already set up from the ascertained value of the property.

In Mr. Kasemeier's opinion the matter of depreciating equipment rests entirely with the company and depends on local conditions, class of cars and extent of maintenance. The practical way is to make a valuation of each road's equipment less the final scrap value, estimate its remaining life and thus secure a rate. Mr. Kasemeier believed that obsolescence is the most vital element in this question.

Mr. Campbell, representing the Illinois Traction System, said that a company should write off as much depreciation on equipment as seemed proper. The real question is whether it desires to spread this amount over a period of years or to be burdened with the whole amount when the equipment is scrapped. His company is trying to get an appraisal of the scrap value of the car bodies and electrical equipment to be deducted from the cost, the remainder to be spread over certain periods at the following rates: bodies and truck equipment, 4 per cent; electrical equipment, 5 per cent; freight equipment, 5 per cent; locomotive and bonding cars, 6 per cent. In cases where the company was unable to ascertain the purchase cost, the superintendent of motive equipment estimated the replacement cost. The company intends to figure depreciation on all the secured amounts down to July 1, the starting point. Each car is a separate unit in this accounting work. Mr. Kasemeier and Mr. Forse agreed that depreciation of equipment on electric railways was a more difficult question to handle than on steam railroads because of the difficulty of judging the value of electrical equipment as it is maintained, renewed or superseded from time to time.

Mr. Piper, in giving the experience of a manufacturing plant, said that fifteen years ago the Westinghouse board decided to discontinue charging to capital account expenditures made for additions to small tools, patterns, etc. Henceforth all went to operating expenses except the cost of special tools and patterns, which was treated as a development cost of special apparatus. Four years ago the plant was appraised and the difference between the book value and the appraised value was set up as a reserve. Since then additions to the reserve have been made by monthly charges to operating expenses, based on a flat percentage rate of the appraised value without respect to the different classes of equipment. A lower rate, however, is used for buildings. The results of this plan have more than proved the policy of the company to be conservative. The plan is not quite so accurate as it should be, but the board decided that the blanket rate was sufficient for all practical purposes. The plan provides for reappraisals at the end of each five-year period.

F. K. Young, auditor Scioto Valley Traction Company, Columbus, Ohio, said that no two lines could use the same rate for depreciation. He asked whether companies were compelled to show depreciation charges monthly or whether they were allowed at the end of the year to appropriate an amount for depreciation from surplus without any charge to the maintenance accounts. In support of this plan he said that this method would show the real and tangible operating expenses for each month and in addition satisfy stockholders and the public that depreciation charges for each fiscal period were being provided for, but the question was whether this method of accounting would satisfy the Interstate Commerce Commission. Mr. Forse replied that the commission requires monthly charges to be included in the operating expenses, but that a company may publish its own annual report in a form to do itself the most justice and secure proper credit for its depreciation accounting.

In connection with the situation in Cleveland, Mr. Kilfoyle explained that the street railway settlement there provided for a charge of 5 cents per car-mile for maintenance, renewals and depreciation. An average

of this amount per year was set aside from earnings up to March 1, 1913, but the fund was insufficient to take care of maintenance and renewals, there being an overdraft of $324,000 without any provision for depreciation. A short time ago the company agreed with the city to charge out $6,000 per month. Since 1913 there has been another overdraft of $584,000 without any provision for depreciation. The 5 per cent rate per car-mile provides about $1,500,000 a year, or 20 per cent of the gross earnings. Mr. Kilfoyle cited these figures to show how impossible it is for engineers to estimate accurately what will be needed for maintenance, renewals and depreciation.

President Hixson stated that it was unwise to endeavor to distinguish between maintenance, depreciation and renewals on the books, and that these should all be grouped under one account, any amount remaining from the estimated sum after provision for maintenance and renewals to be considered as the charge to depreciation. Mr. Kilfoyle also thought that there should be one reserve to cover all these items.

NEW OFFICERS

At the conclusion of the discussion on depreciation of equipment, the nominating committee presented the names of the following nominees: President, H. B. Cavanaugh, auditor Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio; first vice-president, F. T. Loftus, auditor Indianapolis & Cincinnati Traction Company, Rushville, Ind.; second vice-president, J. B. Hooper, auditor freight accounts Detroit (Mich.) United Railway; secretary, A. L. Neereamer, secretary Central Electric Railway Association, Indianapolis, Ind. Upon motion the secretary was instructed to cast one ballot for the above nominees. The election of Mr. Neereamer as secretary effected a consolidation of the offices of treasurer and secretary. The following members were elected to the executive committee: J. N. Tabb, treasurer Parkersburg, Marieta & Interurban Railway, Parkersburg, W. Va.; T. P. Kilfoyle, auditor Cleveland (Ohio) Railway; Oren A. Small, auditor Benton Harbor-St. Joseph Railway & Light Company, Benton Harbor, Mich.; Edward Hayes, auditor receipts Illinois Traction System, Champaign, Ill., and F. K. Young, auditor Scioto Valley Traction Company, Columbus, Ohio.

The new president was escorted to the chair by Messrs. Kilfoyle and Young, after which speeches were heard from the newly-elected officers. President Cavanaugh then stated that at the last meeting in Cleveland it was voted to prepare a book of forms. On account of the Interstate Commerce Commission classification this had not been done, but he intended early in 1915 to ask for a new set of forms to be turned over to the new first vice-president. Mr. Kilfoyle moved that these forms be kept in the office of the secretary of the Central Electrical Railway Association and that the latter official should collect the forms. This motion was amended by Mr. Loftus to the effect that the secretary should be instructed to call upon a committee to be appointed by the president to help keep the book up to date. The motion was passed as amended and the meeting then adjourned.

PRESIDENT'S ADDRESS

BY L. T. HIXSON, AUDITOR TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY, INDIANAPOLIS, IND.

In opening his address, President Hixson reviewed the advances that have been made in electric railway accounting during recent years but also mentioned several problems that still remain to be solved. In his opinion the part of the new Interstate Commerce Commission's instructions most difficult to comply with is that referring to depreciation. Another point was that while most companies use the official classification, very few secure the full benefit of the information which could be furnished from accounting departments, because of the great lack of proper departmental costs. Valuable lessons could be learned from manufacturing concerns regarding cost accounting, which term embraces timekeeping and storekeeping. Electric railway accountants might also well observe the methods employed by any large and progressive mercantile company with reference to accounts receivable.

President Hixson called attention to the facts that some state commissions have adopted a uniform classification of accounts for electric utilities and that the increasing number of combined railway and lighting properties make this form of accounting a most suitable subject of study for electric railway accountants. He observed also that some slight difficulty had been experienced in the past in regard to the failure of some companies to comply with rulings established by a majority vote of the association and pertaining to uniform practice in handling reports and settlements on interchanged business. He suggested that the executive committee of the Central Electric Railway Association should be requested to inforce the rulings made. Besides the above points, the following recommendations were made: the consolidation of the standing committee on passenger accounts and the standing committee on freight accounts into a standing committee on passenger and freight accounts, this step being advisable on account of many matters which come within the scope of both committees; a study of the balance sheet, with reference principally to a proper analysis to make this statement more intelligible; and the formation of a condensed system of departmental expenses, such system to be subsidiary and readily adapted to the present system of accounts.

COST ACCOUNTING IN A MANUFACTURING PLANT

BY G. D. PIPER, DIRECTOR OF WORKS ACCOUNTING WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, PITTSBURGH, PA.

In the main works of the Westinghouse Electric & Manufacturing Company the investment in working and trading assets is divided into three groups—i.e., (1) raw materials and supplies, (2) finished parts and completed apparatus, and (3) work in progress.

(1) Raw materials and supplies: The investment in this account represents the cost, f.o.b. works, of raw materials and supplies purchased and held in general stores pending withdrawals by the various works departments or shipment direct from the former to the customer.

(2) Finished parts and completed apparatus: The investment in this account represents the factory cost value of a portion of the parts made in the various works departments, delivered by the latter to general stores and held therein pending withdrawals by the works to be later assembled into complete salable units. It also represents the factory cost value of the completed apparatus made for specific customers, resting temporarily in this account awaiting shipment, and completed standard apparatus not yet sold, but a stock of which has been authorized by the commercial department.

(3) Work in progress: The investment in this account represents the factory cost value of parts and apparatus in course of manufacture preliminary to being delivered to general stores; the cost of working stocks of raw materials withdrawn from general stores on which no labor has yet been performed; the factory

cost value of working stocks of finished parts withdrawn from general stores for assembly into complete units, and the factory cost value of stocks of certain classes of finished parts which are always carried in this account. The latter are the heavier parts (frames, bedplates, shafts, etc.) to move which in and out of stores would entail unnecessary expense.

It is with the last named account that the following mostly deals. The total investment in this account is divided into forty odd sub accounts, this division having been made to conform very largely to the line-up of the supervision.

Handling Customer's Order

Upon receipt of a customer's order, a list of the apparatus sold is written on a form which is thereafter known as a "general order." This general order sheet is sent to the storekeeper, who, from his records of finished parts and completed apparatus, ascertains whether the apparatus is in stock, on order, or whether it will need be built specially for that specific customer. All items on the general order that are in stock or are coming through on an order for stock are marked "in stock" or "available." For items that must be specially made the storekeeper enters a manufacturing order, copies of which are distributed to the various works departments involved, and to the engineering department. The latter department proceeds to prepare a specification for each kind and size of apparatus for which manufacturing orders have been entered, detailing practically every item entering into the construction of the apparatus. A copy of the complete specification is sent to the works departments that will assemble the apparatus, and additional copies of such portions of specification as contain parts to be made in other departments and forwarded to the latter.

The first element of the total cost identified with the order is incurred in the engineering department in the preparation of the specification. This cost is secured through the medium of semi-monthly time reports turned in by this department, including drafting, tracing and clerical or specification divisions. This item of cost covers an amount for the overhead expenses of the department and becomes part of the "development cost," the total development cost including special tools, patterns, fixtures, etc., in addition to the engineering development.

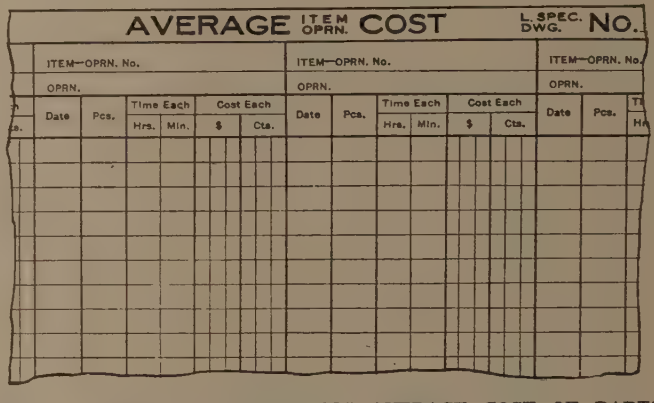
Material Cost

Upon receipt of the specification in the works department steps are taken to provide the necessary material. If the raw materials and finished standard parts listed in the specification are not to be had from the working stocks carried by the department, and are not to be provided by a feeder department, the item or items lacking are ordered from the general stores by a requisition, which is made out in duplicate, the carbon copy accompanying the material to the section ordering same and the original being retained by the stores department for pricing and extending. After this latter operation is finished, the day's, or possibly several days', issues are summarized and the proper stores accounts credited and the work in progress account of the department drawing the material charged. The requirements are forwarded to the latter to be used in maintaining the price files in up-to-date condition, and, where required, as a basis for determining the material cost of the order. In case surplus material has been withdrawn on an order, the surplus is credited to the order by returning same to general stores on a credit memorandum, which is contra to the requisition.

It might be inferred that the material portion of the total cost is determined from these requisitions and credit memoranda. This is not the case, however, as the values appearing on these requisitions are used in arriving at the material cost of an order in comparatively few cases. The majority of the material costs are determined from tabulated lists of material commonly known as "bills of material." The bill of material is part of the information appearing on the face of each drawing, and is simply a tabulation of the description, quantity, dimension, etc., of the raw material necessary to produce one unit of each item appearing on the drawing.

Besides these two methods of building up the material cost, there is another source of material charges. Some parts will be delivered to the assembling department by the feeder departments at values which represent the factory cost of those parts. These charges flow into the assembling departments on interworks delivery reports, which show the quantity, description, weight or measurement, unit price and value. One of the three copies made out bears the factory cost for which the feeder department's work in progress account receives credit and the assembling department's work in progress account is correspondingly charged. The latter in building up the cost of the complete unit treat these interworks charges as "material," notwithstanding these values include both labor and overhead expense.

Another source of material charges, but one not frequently employed in connection with manufacturing orders for the reason that the specifications automatically provide for all work and material to be regularly supplied by other departments, is through the medium of foreman's requisitions. In some cases a department


AVERAGE ITEM OPRN. COST L. SPEC. DWG. NO.

ITEM—OPRN. No. OPRN.						ITEM—OPRN. No. OPRN.						ITEM—OPRN. No. OPRN.			
Date	Pcs.	Time Each Hrs.	Time Each Min.	Cost Each $	Cost Each Cts.	Date	Pcs.	Time Each Hrs.	Time Each Min.	Cost Each $	Cost Each Cts.	Date	Pcs.	T Hr

FORM I—USED IN TABULATING AVERAGE COST OF PARTS RECEIVED FROM OTHER DEPARTMENTS

is unable, owing to an excess amount of work for its equipment, equipment disabled or for other reasons, to perform all the work assigned to it promptly enough to meet production requirements. When this condition obtains a requisition is issued by the foreman upon another department, requesting the latter to perform certain labor on material which will be furnished by the department issuing the requisition. It may be that the department on which the requisition is issued will be asked to supply the material as well as the labor. These transactions, commonly termed "requisition jobs," are treated in a similar manner to the interworks deliveries in the building up of the material cost in the assembling department.

For convenience in tabulating the average cost each of parts received from other departments at various times and in varying quantities Form I, shown herewith, is used, it serving the double purpose of checking the prices at which the supplying department charges the using department and providing a price file for the latter. The card is 5 in. x 8 in., containing four similarly-ruled columns front and back. This form is also used to record the "average" cost of labor operations

(frequently repeated) in the department in which they are performed.

LABOR COST

The Westinghouse Company has four different systems of wage payment—viz., day work, piece work, premium and bonus. The premium system of wage payment predominates, however, for the chief reason that furnishing of labor costs on individual orders, and it is this system is more generally used on productive work throughout the main works than are the other three.

The receipt of the specification in a section prompts the time clerk to open up a labor record. This is a loose-leaf sheet, 8¾ in. x 15 in., ruled on both sides with five labor columns. Each column is headed with the operator's name and number, base time, limit time, pieces, and rate spaces. Interior rulings are provided for check number, date, hours, pieces, total pieces and cost. This record performs the double function of preventing payment for more pieces than the order calls for and the furnishing of labor costs on individual orders, and it is used where the operations are numerous and extend over a considerable period of time. A similar form, or a 5 in. x 8 in. card, is used in sections where the operations are not so numerous and are shorter. This provides for practically the same information in the column headings as the other form, except that no provision is made for posting money values thereon. Its prime purpose is simply to safeguard the payroll.

TIME AND WORK REPORT — CHECK NO.
WORKMAN — ORDER NO.
OPERATION — LIMIT NO.
DWG. NO.

APPARATUS OR PART	PATTERN NO.	ITEM NO	DATE MO.	DATE DAY	HOURS REG.	HOURS O. T.

NO. PIECES REQUIRED | LIMIT EACH HRS. MIN. | TOTAL LIMIT HRS. MIN. | HOURS PAID ON ACC'T

NO. PIECES COMPLETED

BALANCE — Time Taken — " Saved

D. W. RATE

Reg. Time
Overtime
Premium
Total

CHECK NOS. OF OTHER WORKMEN ON THIS JOB

DEPT.

BASE TIME EACH | HRS. | MIN. — FORM 7112 REV. 8

OUT — COMPLETE
IN — INCOMPLETE

Serials — PIECES POSTED — COST POSTED — QUANTITY, QUALITY AND TIME REQUIRED — FOREMAN

FORM II—SINGLE TIME AND WORK REPORT ISSUED BY TIME CLERK TO WORKMAN

Departments using the first labor record employ single time and work reports, as illustrated by Form II. These are issued to the workman by the time clerk upon instructions from the foreman, and are retained by the workman until the number of pieces assigned to him has been completed. Upon completion the time and work report is approved by the foreman, assistant foreman or inspector and surrendered to the time clerk, when a new time and work report for the next job is issued. These reports are then rated, extended, posted to the labor record and forwarded to the payroll clerks.

Departments using the smaller labor record employ a similar form of time and work report, the top portion of which has a carbonized back to facilitate providing a carbon copy. This form of time and work report is kept intact until the values have been extended thereon. Then the original and carbon copy are separated, the former forwarded to the payroll clerk and the latter filed for cost purposes.

OVERHEAD EXPENSES

A writer recently said that there never has been a perfectly satisfactory method devised for absorbing the overhead expenses, and that the aim of the cost accountant should be to adopt the "least unsatisfactory" method. In general the method we employ is the percentage-on-direct-labor plan. While this is not perfect, and is probably not so equitable as the machine hourly rate combined with a productive man hour rate, the company has hesitated to depart from it on account of the expense involved in the operation of these more theoretically correct methods.

The shop accounts approximate forty-five in number, each of which is known by a title, viz., Controller Department, Forge Department, Industrial Motor Departments (three in number), Locomotive Department,

FACTORY EXPENSE—CLASS "A"

.....SECTION

EXPENSES FOR MONTH ENDED ..... 191.. — .....DEPT.

Account No.	Description	Labor	Material	Total
17	Repairs and Renewals: Benches, Cupboards, etc.			
25	Repairs and Renewals: Machine Power Tools			
26	Repairs and Renewals: Belting, other than that driving Machine Power Tools.			
27	Repairs: Handling Machinery, Cranes, Trucks, etc.			
	Repairs and Renewals— 28-1 2. 28 2 0.			

FORM III—MONTHLY STATEMENT OF OVERHEAD EXPENSES BY DEPARTMENTS FOR EACH CLASS OF EXPENSE

Punch Department, Transformer Department etc The overhead expenses for each department are ascertained monthly. While we do not fluctuate monthly the percentages added to direct labor in figuring costs, a comparison is made each month between the percentages used in costs with the percentage relations of the actual expenses to direct labor for that month. Obviously, if wide differences are noted between the percentages used and the actuals, investigations and explanations are demanded by the management.

A monthly statement of the overhead expenses for each department is prepared on record sheets similar to Form III, showing in detail just what amount was expended for each class of expense. This statement is divided into three groups—i. e., class "A," class "B" and class "C." Class "A" are the expenses which are controllable by the foreman of the section (a sub division of a department) and reported in their entirety by the departmental cost clerk. That is to say, nothing is added to this class of expense by the general accounting department. Class "B" are the expenses which are beyond the control of the foremen and general foreman of a department, but are considered

to be largely, although not wholly, controllable by the superintendent of the department. While the bulk of this class of expense is reported by the department itself, some items are added to this group by the general accounting department, but none are added which are not considered as belonging to that class which the superintendent of the department controls wholly or in part. Class "C" are the expenses which are beyond the control of even the superintendent, and, as their titles indicate, are expenses added almost entirely by the general accounting department. After the additions to classes "B" and "C" are made by the general accounting department, copies of these statements are issued to the executives and other department heads, including the superintendents, who can, from a glance at the bottom of the class "C" portion of the expense statement, readily see how the actual percentages compare with the "fixed" or used percentages.

Numerous bases are used for distributing the various expenses added by the general accounting department on the class "B" and class "C" portions of these statements, those most commonly used being the relative number of employees, floor space, productive labor, etc. Such expense items as depreciation, power, storekeeping and shipping and charges for defectives are allocated to departments on more definite bases than the more or less arbitrary ones just referred to.

The company endeavors to control the major portion of the total factory expenses by a comparatively simple but effective method. After a review of the records for a considerable period, we established standard percentages of direct labor for the various classes of expenses which the superintendent can control, and within which he is expected to confine his expenditures for the month. At the beginning of each month the superintendent estimates the direct labor for his department or departments for the ensuing month, and by multiplying this estimated direct labor by the "standard" percentages he determines the amount he can spend during that month for each class of expense he controls. To enable him to keep in close touch with the condition of each expense account for which an allowance has been established two forms have been provided. One covers an individual account and shows the date of requisition, requisition estimates and allowances unspent. The other is a condensed summary of the whole analyzed as to accounts and days of the month.

In determining the percentages that are added to direct labor to absorb the overhead expenses, neither one general percentage or a few varying percentages are used. Rates have been established wherever an analysis and distribution of the "B" and "C" expenses to individual sections indicated that separate rates were justified. In fact, there are at present approximately one hundred sectional overhead percentages, some of which may be of the same value, ranging from 25 per cent to over 200 per cent. With this flexibility, combined with the advantage of segregated works departments, we are not so far away from the theoretically correct plan of machine hour rate supplemented by a productive man hour rate.

COMPOSITION OF COST

The combination of material cost and labor cost gives the prime cost of articles manufactured, which in turn becomes the factory cost on the addition of factory overhead. The further addition of commercial overhead gives the commercial cost, while the total cost is a combination of the commercial cost and the profit. The total cost may itself be increased by charges for boxes and containers, and development expenses and royalties, if they apply, are treated as a surcharge at this point, thus giving the selling price.

Reducing the Operating Ratio

In a recent issue of this paper S. H. Bennett, auditor Hagerstown & Frederick Railway, gave an account of some of the methods by which the company was hoping to bring down its operating ratio from 64 per cent to 50 per cent. Recent reports of the company show that its efforts toward economy are proving successful, as shown by the following table:

INCREASES IN OPERATING REVENUES, 1913 TO 1914

	Railway	Light and Power	Gas	Total
July	$422.82	$1,527.92	$139.10*	$1,811.64
August	180.37*	920.19	150.35*	589.47
September	1,697.82	927.34	234.84	2,860.00
October	1,125.01	1,247.86	49.27	2,422.14
Total	$3,065.28	$4,618.31	$10.34	$7,683.25

*Decrease.

INCREASES IN NET OPERATING INCOME, 1913 TO 1914

	Railway	Light and Power	Gas	Total
July	$1,044.95*	$1,756.49	$34.75*	$676.79
August	1,783.47	1,553.97	305.92	3,643.36
September	2,279.52	1,036.76	520.75	3,837.03
October	822.86	2,821.09	302.85	3,946.80
Total	$3,840.90	$7,163.31	$1,089.77	$12,093.98

*Decrease.
Decreases in operating ratio, 1913 to 1914, July, none; August, 8 per cent; September, 7.2 per cent.

The operating ratio for October, 1914, was 54.40 per cent as compared with 61.24 per cent for October, 1913. For the four months ending Oct. 31 the ratio was 56.07 per cent as compared with 61.70 per cent for the same period last year.

The company accounts for its reduction in expenses as follows:

In the power department some inexpensive changes in the forced draft system cut down fuel costs by one-third. At present the company is using with very satisfactory results small-vein coal costing from $1 to $1.10 per ton where formerly from $1.35 to $1.65 per ton was paid. The consumption of power by the cars has been reduced by training motormen regarding the importance of saving current. In car service the elimination of all layovers with but a slight increase in running time has resulted in a reduction of car mileage more than 6 per cent. It was accompanied by an actual increase in revenue due at least in some measure to a rigid adherence to published schedules.

In the way department a redistribution of the track force resulted in a labor saving of more than 10 per cent. Under the present arrangements foremen and their men live on the sections of track which they cover, while under previous conditions this was not done and a great deal of company time was spent in going to and from work.

In the passenger equipment no reductions in maintenance cost have been made, but in the freight equipment there has been considerable gain. During the months of July, August and September, owing to the increased volume of business thrown upon the road by its steam railroad connections, it was necessary to operate for twenty-four hours a day to avoid freight blockades. It was possible to do this because a blower outfit, controlled automatically and continuous in its action, had been placed on the largest locomotive, and armature and field troubles were thus greatly reduced while efficiency was increased. Formerly it was necessary to keep this locomotive in the shop for a much greater proportion of the time than at present.

In general, the cost has been brought down by organization, by abolishing useless departments and combining departments in some cases, by the elimination of duplication of work and by the lessening of useless "red tape."

Operating Plans for the Electrified Division of the C., M. & St. P.

Provision for Continuous Power Supply—Twin-Conductor Trolley-Wire Suspended by Alternate Hangers from a Single Catenary—Operation of Pusher Locomotives on Down Grade

The operating plans for the electrified division of the Chicago, Milwaukee & St. Paul Railway possess special interest, for the reason that this is the first attempt to install and operate electric locomotives on tracks extending over several engine divisions. Under these conditions it is claimed that the full advantage of electrification can be secured. Previous terminal and tunnel installations of electric operation have been made necessary, more or less, by reason of local conditions; but the electrification of this steam road has been undertaken purely on economic grounds, with the expectation that superior operating results with electric locomotives will return an attractive percentage on the investment required.

C., M. & ST. P. ELECTRIFICATION—ONE TRAIN OF SIXTY-FIVE CARS IN TRANSIT ON ELECTRIFIED BUTTE, ANACONDA. & PACIFIC RAILWAY CONNECTING WITH THE MILWAUKEE SYSTEM

As described in the full technical description of the electrification that was published exclusively in the ELECTRIC RAILWAY JOURNAL for Nov. 21, a contract has been let to the Montana Power Company for an adequate supply of energy over the 440 miles of main line considered for immediate electrification. This company has covered a great part of Montana and part of Idaho with a network of transmission lines, which are fed from several sources that provide a total developed and undeveloped capacity of 244,000 kw. The several power sites are inter-connected by transmission lines on steel towers and operating at 100,000 volts. Ample water storage capacity is provided in the Hebgen Reservoir, amounting to 300,000 acre-feet, and this is supplemented by auxiliary reservoir capacity at the several power sites, bringing the total up to 418,000 acre-feet. The Hebgen Reservoir is so located at the head waters of the Madison River that water drawn from it can supply in turn the several installations on the Madison and Missouri Rivers. Consequently the same storage capacity is used a number of times, affording an available storage capacity considerably greater than is indicated by the figures given. It would seem, therefore, in changing from coal to electricity as a source of motive power, that the railroad is amply protected in respect to the reliability and continuity of the power supply.

The initial contract calls for nine freight locomotives and three passenger locomotives, each weighing 260 tons, and taking current from a twin-conductor trolley, composed of two No. 0000 wires suspended side by side from the same catenary by independent hangers alternately connected to each trolley wire. This form of construction permits the collection of very heavy current by reason of the twin contact of the pantograph with the two trolley wires, and also insures sparkless collection under the extremes of either heavy current at low speed or more moderate current at very high speed. It is stated that the twin-conductor type of construction is equally adapted to the heavy grades calling for the collection of very heavy currents, and on the more level portions of the profile where maximum speeds of 60 m.p.h. will be reached with the passenger trains having a total weight of more than 1000 tons. The advantage of this type of construction is due partly to the greater surface for the collection of current, but largely to the very great flexibility of the alternately suspended trolley wires, a form of construction which eliminates any tendency to flash at the hangers either at low or high speed. Each locomotive, as stated in the above mentioned article, will be equipped with eight 430-hp General Electric motors. These will be twin-geared to the driving axles in the same manner as on the Butte, Anaconda & Pacific, the Detroit River Tunnel and the Baltimore & Ohio locomotives, a pinion being mounted on each end of the armature shaft. The motors are of the commutating-pole type and have openings for forced ventilation from a motor-driven blower located in the cab. The freight locomotives are designed to haul a 2500-ton trailing load on all gradients up to 1 per cent at a speed of approximately 16 m.p.h., and this same train load, unbroken, will be carried over the 1.66-per cent and 2-per cent ruling grades on the west and east slopes of the Rocky Mountain Divide with the help of a second similar freight locomotive acting as pusher. Track provision is being made at Donald, the summit of the grade, so that the pusher locomotive may run around and couple to the head end

of the train to permit electric braking on the down grade. In this case the entire train will be under compression and will be held back by the two locomotives at this head end, the entire electric braking of the two locomotives being under the control of the motorman in the operating cab of the leading locomotive.

It is considered that electric braking will prove very valuable in this mountain railroading, for, in addition to providing the greatest safety in operation, it returns a considerable amount of energy to the substations and transmission system, which can be utilized by other trains needing power. In this connection, the electric locomotives will have electric braking capacity sufficient to hold back the entire train on down grade, leaving the air-brake equipment with which they are also equipped to be used only in emergency and when stopping the train. There is provided, therefore, a duplicate braking system on down grades, which should result in the greatest safety of operation and the elimination of a considerable part of the customary break-downs, wheel and truck wear and overheating, thus reducing maintenance and improving track conditions.

With the completion of the remaining engine divisions, it is proposed to take advantage of the possibilities afforded by the construction of the electric locomotive by combining the present four steam engine divisions into two locomotive divisions of approximately 220 miles length, changing crews, however, at the present division points. As the electric locomotive needs inspection only after a run of approximately 2000 miles, requires no stops for taking on coal or water, or layover due to dumping ashes, cleaning boilers or petty roundhouse repairs, it is expected that the greater flexibility of the locomotive so provided will result in considerable change in the method of handling trains or limited by the restrictions of the steam engine.

Express Cars in City Service

Rush-Hour Service in Boston and Non-Hour Service in Schenectady Are Described

As a means to the end of improving schedule speed on certain runs several companies have recently begun operating express cars sandwiched in between the regular local cars in city service. The Boston Elevated Railway about a year ago commenced this kind of operation in the rush hours on certain routes where the segregation of through from local traffic appeared desirable. At present the express cars are operated outward-bound in the afternoon rush hours from the rapid transit terminals at Dudley Street, Harvard Square and Sullivan Square. On the front and rear vestibules a 19-in. x 21-in. sign marked "Limited Stops" is hung as the car enters the terminal station of the rapid transit lines, announcement of the first stopping point being made by platform men, motormen and conductors. In the morning, inward-bound cars approaching junction points where inspectors are located may be run as expresses to the rapid transit terminal upon order of the inspector. In this case the limited-stop sign is taken from the inside of the vestibule and hung in position, the car number being taken by the inspector. Inward-bound limited-stop cars stop to discharge passengers between the point of departure and the rapid transit terminals, and outward-bound cars of this class stop to receive passengers between the terminal and the first scheduled stop after beginning the express run. Of seventy-five outward-bound cars that are run from Harvard Square in one afternoon rush hour, twenty-five are in limited-stop service. With this close headway it is impossible to provide gaps ahead of the express cars, but the distribution of the traffic and the comfort of the patrons are much improved.

The Schenectady Railway Company also has inaugurated a special express service during the noon hour from the General Electric plant to the suburbs. This started with one car which was first operated for and patronized principally by the heads of the various departments in this plant. Later, it became so popular that the custom gradually extended from the heads of departments to the general office help, and at present all are enabled to go to their homes for lunch if they so desire. The company is now operating express cars on every line to the suburbs. Many of these cars do not make any stops until reaching the outlying sections, and with one exception the cars are able to reach the terminals within ten minutes from the time they leave the main entrance to the General Electric Works. As the headway on all city lines around the noon hour is not closer than fifteen minutes and as the regular cars are made to wait at the intersections and junction points, all express cars can receive a clearance at this hour. Very little delay is experienced in the regular service on account of these express cars having the right of way. About 75 per cent of the cars make return trips, and employees are therefore able to eat their lunch at home and return to work within one hour. It is estimated that about 25 per cent of the employees have a lunch period of one hour and fifteen minutes, and they usually return on the regular cars.

Senate Hearings on Adamson Water Power Bill

The hearings on the so-called Adamson bill, which has already passed the House, were begun on Dec. 9 and have continued during the past week. Testimony has been presented by John A. Britton, vice-president Pacific Gas & Electric Company; W. A. Brackenridge, vice-president Southern California Edison Company; Franklin T. Griffith, president Portland (Ore.) Railway, Light & Power Company; George C. Ward, vice-president Pacific Light & Power Corporation, and others. The testimony indicated that state regulation in California had been in general satisfactory to the companies. The provision in the bill that not more than 50 per cent of the output of a plant should be sold to one customer was objected to on the ground that it will hamper development, as will also the limiting of the term to a short period, say less than fifty years. Incidentally the economy of modern steam plants was brought out, one speaker stating that his company had been able to produce from 285 to 290 kw-hr. per barrel of oil.

New Bulletin on Coal Analyses Issued

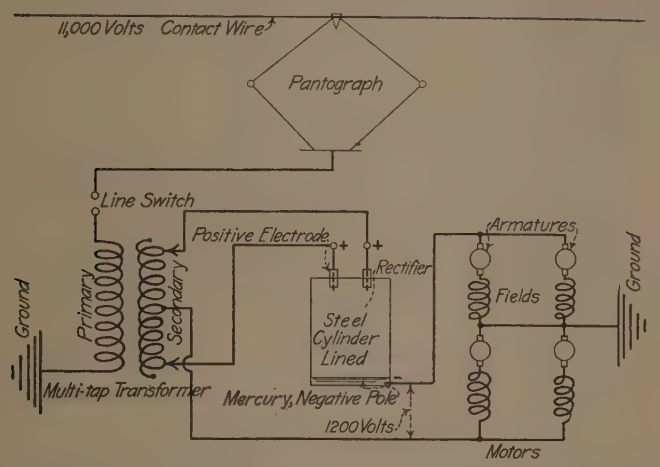
The United States bureau of mines recently issued a small edition of Bulletin 85, "Analyses of Mine and Car Samples of Coal Collected in the Fiscal Years 1911 to 1913," by Arno C. Fieldner, Howard I. Smith, Albert H. Fay and Samuel Sanford. The present bulletin presents analyses and descriptions of samples of coal collected from many mines throughout the entire country. In order that the material in this bulletin may be made to supplement that presented in Bulletin 22, "Analysis of Coals in the United States," the same plan of geographical classification has been followed, the analyses and descriptions of the samples being grouped in alphabetical order according to the state, county and town near which the mines or prospects sampled are situated. Bulletin 22 was said to be the most comprehensive publication ever issued on the coals of the United States, and the new bulletin is an extension of that work.

Mercury Vapor Rectifier Locomotive an Accomplished Fact

Trial Equipment Has Covered 20,000 Miles and Is in Revenue Service on New Haven Branch Line

The Westinghouse Electric & Manufacturing Company has had in service for some months a motor car provided with a Westinghouse-Cooper-Hewitt mercury arc rectifier locomotive equipment. This consists essentially of a transformer for lowering the a.c. line voltage from 11,000 to about 1200, with secondary taps for use in varying the voltage; two single-phase rectifiers, one for service and one for reserve; four d.c. motors of 1000-hp combined capacity, and the necessary control apparatus, rectifier exciter, etc.

This demonstration was for the purpose of developing the rectifier locomotive equipment for the Pennsylvania Railroad, and it is installed on a combination baggage and passenger car furnished by that railroad. The reason for installing the equipment on a car in this instance was to secure in the readiest manner possible railroad operation with an equipment of substantial size. This car was first tried out on the Westinghouse Company's test track at Pittsburgh. As the length of this track and the power available were not sufficient for an ample test under service conditions the equipment was later transferred to the electrified zone of the



MERCURY RECTIFIER LOCOMOTIVE EQUIPMENT—SIMPLIFIED ELECTRIC CIRCUIT DIAGRAM

New Haven Railroad and is now running on the New Canaan branch of that company. After preliminary trials it was put into revenue service, hauling trains, and to date has been operated more than 20,000 miles. Its present schedule calls for a daily mileage of 240. These tests were designed to demonstrate the durability of the equipment under general service conditions, such as sustained high voltage, voltage fluctuations, as well as mechanical shocks and vibrations.

The fundamental parts of the equipment and the circuit connections are shown in the accompanying diagram. Current is drawn from the 11,000-volt overhead contact wire through the standard pantograph of the New Haven Railroad. It flows through a line switch and the primary winding of a lowering transformer to the rail return. The transformer secondary is provided with a center tap and with a number of others equally spaced two by two from the center on both sides to permit the varying of the a.c. voltage from zero to the maximum. The center tap connects with the terminal of a group of four motors connected permanently in series-parallel. These motors are standard Westinghouse No. 308, wound for 600 volts. The group is grounded at the center to limit the d.c. voltage between any point in the equipment and ground to 600. The outside secondary transformer terminals connect to the two positive electrodes at the top of the rectifier. The remaining connection is from the mercury or negative terminal of the rectifier to the other terminal of the motor group.

The rectifier consists of a light steel cylinder container approximately of 20-in. diameter and 36-in. height. The electrodes enter at the top of the container through airtight insulating bushings, projecting a short distance into the cylinder. The arc is started by means of a small motor-generator exciter. No exter-

MERCURY RECTIFIER LOCOMOTIVE EQUIPMENT—MOTOR CAR HAULING TWO COACHES

nal reactance is needed on the d.c. side, as the motors furnish ample reactance for the purpose of steadying the current. That they do so is indicated by the fact that they operate as well on the rectified current as on that supplied from a rotating machine. The voltage drop in the rectifier is about 25 volts; practically regardless of the magnitude of the current, so that at say 750 d.c. amp, which is about full load for the motors, the power loss is 18¾ kw, and the efficiency, at 1200 volts, is very high.

Details of the cooling system, electrodes, exciter connections, etc., are not yet available, but it is understood that the important problems in these items, as well as the larger ones, have been successfully met on this equipment.

The rectifier weighs but a few hundred pounds, and the motor car complete weighs 72 tons. The rectifier equipment is mounted in the baggage compartment and occupies, with the switch groups and transformer, not more than one-half the floor area. The accompanying half-tone shows the rectifier train in service on the New Canaan branch.

London Motor Omnibuses at the Front

A number of the motor omnibuses belonging to the London General Onmibus Company are serving as armed road cruisers in the British battle line in France. They are driven in a number of cases by men from the omnibus company which, with the other transportation companies in England, has sent many men to the front. The associated transportation lines in London which are under the direction of Sir Albert Stanley publish the news in regard to employees at the war as well as the progress of the relief fund of the company in a small paper, published every two weeks. The last few issues of this paper received in this country contain letters from men who have enlisted in the army and navy and also chronicle the status of the relief fund, which, up to a recent date, amounted to £11,319.

COMMUNICATIONS

Effects of Variance in Car-Wheel Diameters on Motors

St. Louis, Mo., Dec. 5, 1914.

To the Editors:

The communications dealing with the effects of variance in car-wheel diameters on motors that have appeared in your issues of Oct. 3, Oct. 31 and Nov. 28 reveal not only uncertainty concerning the magnitude of the effects attributable to differences in wheel diameter but also a belief that the solution of the problem involves considerable complication. As a matter of fact the problem is relatively simple, and is susceptible of complete solution without the use of mathematics and with no more data than are to be found in the curves of motor performance furnished by the manufacturers. It is not unlikely that the problem has been solved by others, especially by the designers of railway motors, but as the writer has been unable to find any publication bearing upon the question, the following analysis is submitted for the use of those who are interested in the matter.

The torque and speed curves in the accompanying diagram are taken from a bulletin of the General Electric Company, and in the original form showed tractive effort and speed of car as functions of current input for a motor having a gear ratio of 25:73 and with driving wheels of 33-in. diameter. For the purpose of this discussion speed in miles per hour has been converted into motor revolutions per minute, and tractive effort into net motor torque in pound-feet. The change from speed in miles per hour to speed in revolutions per minute was made by using the simple relation

$$\frac{\pi \times \text{wheel diameter in inches} \times \text{r.p.m.} \times 60 \times \text{gear ratio}}{12 \times 5280} = \text{miles per hour},$$

or, since wheel diameter equals 33 in. and gear ratio is 25:73, it follows that

$$\text{r.p.m.} = 29.76 \times \text{miles per hour}.$$

Similarly,

$$\frac{\text{Tractive effort} \times \text{wheel radius in inches} \times \text{gear ratio}}{12} = \text{net motor torque in pound-feet}.$$

or,

$$\text{net motor torque} = 0.471 \times \text{tractive effort}.$$

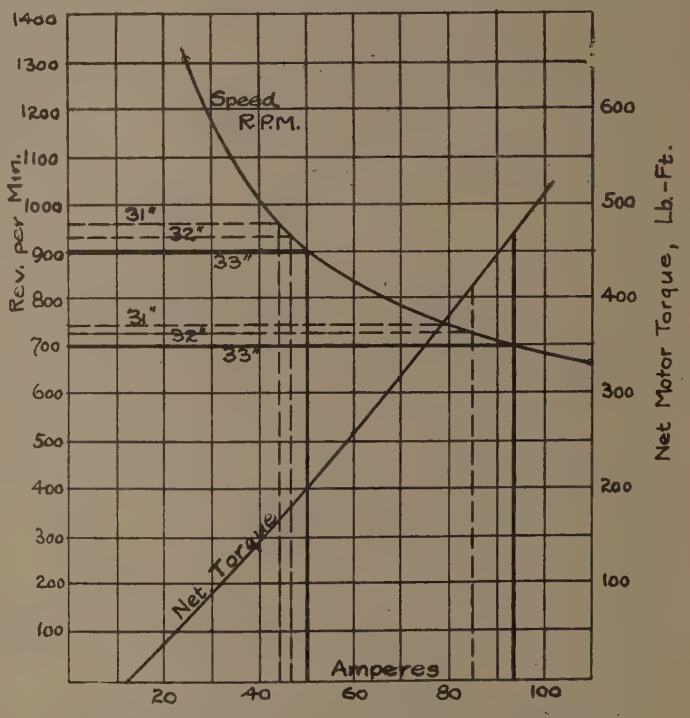
The consideration that determines the division of the load between two identical motors having equal gear ratios but driving wheels of different diameters is that the peripheral velocities of both sets of driving wheels must be the same, for otherwise there would be slipping of the wheels. It follows from this fact that the actual speeds of the two motors (expressed in revolutions per minute) will be to each other in the inverse ratio of their respective wheel diameters. Thus, if one motor of a pair has 33-in. wheels and the other 32-in. wheels, the latter will run faster than the former in the ratio of 33 to 32.

For example, let *A* be a motor with the characteristics shown, and let it be provided with 33-in. wheels; and let *B* be an exactly similar motor, with the same gear ratio, but with 32-in. wheels. If motor *A* runs at 900 r.p.m., corresponding to a car speed of 30.3 miles per hour, motor *B* will run at a speed of $900 \times 33/32 = 929$ r.p.m. Reference to the curves shows that under these conditions motor *A* will take 50 amp and will develop a torque of 200 lb.-ft., while motor *B* will take 47 amp and will develop a torque of 180 lb.-ft. The tractive effort communicated through the 33-in. wheels will be 425 lb. and that through the 32-in. wheels will be 394 lb.

Again, if the motor *A* runs at 700 r.p.m., equivalent to a car speed of 23.5 miles per hour, its current input will be 93 amp and the tractive effort 1000 lb.; at the same time motor *B* will run at $700 \times 33/32 = 722$ r.p.m., and will take only 85 amp and develop a torque of 410 lb.-ft. and a tractive effort of 899 lb.

In the figure lines have been drawn to indicate the method of determining the effect of a 2-in. difference between the wheel diameters, the diameter of the wheels of motor *A* being assumed, as before, to be 33 in., while those of motor *B* are taken as 31 in. Under these conditions a speed of 900 r.p.m. in the case of motor *A* corresponds to a current of 50 amp through *A* and of 44 amp through *B;* the corresponding torques are 200 and 170 lb.-ft., and the tractive efforts are 425 and 372 lb., respectively. When motor *A* runs at 700 r.p.m., the currents through *A* and *B* are, respectively, 93 and 80 amp, the torques are 470 and 380 lb.-ft., and the tractive efforts 1000 and 832 lb.

In the case where the wheel diameters were assumed to be 33 in. and 32 in., respectively, the currents at an



EFFECTS OF VARIANCE IN CAR-WHEEL DIAMETER

assumed speed of 900 r.p.m. for motor *A* were in the ratio 50:47. The copper losses in the two motors will then bear to each other the ratio $(50/47)^2$, or, in other words, the copper loss in *A* will be 13 per cent greater than it is in *B;* at the same time the core loss of *A*, due to the 6 per cent greater excitation, will be about 2 per cent greater than in *B*, so that *A* is called upon to radiate about 15 per cent more heat than is developed in *B*, while its speed of rotation is about 3 per cent less than that of *B*. At a car speed of 23.5 miles per hour the copper loss of motor *A* is 30.5 per cent greater than that of motor *B*, and the core loss will be about 9 per cent greater. These differences become more and more pronounced with increasing differences between wheel diameters; thus, with diameters of 33 in. and 31 in., and at a car speed of 23.5 m.p.h., the copper loss of motor *A* is 35 per cent greater than that of motor *B*, and the core loss about 10 per cent greater.

It will be evident from the diagram that a difference of wheel diameter of only ¼ in. will not have much influence unless the speed curve bends around very

sharply toward the horizontal, as in motors with highly-saturated magnetic circuits. In general, however, the conclusions deducible from this analysis may be applied to any standard railway motor, since the performance curves of practically all motors have quite similar shapes. It will be understood, of course, that the numerical values used are merely illustrative of one particular equipment.

A. S. LANGSDORF,
Dean of the College of Engineering.

Substation Spacing in A.C. and D.C. Systems

THE NEW YORK, NEW HAVEN & HARTFORD RAILROAD COMPANY

NEW HAVEN, CONN., Dec. 15, 1914.

To the Editors:

In your Dec. 5 issue I note with interest an abstract of a paper read by H. F. Parshall, entitled "Economics of Electric Railway Distribution." Mr. Parshall shows clearly the large economic gain which follows by increasing from 600 volts to 1200 volts, and the still further gain when the potential is raised to 2400 volts. He also points out that beyond 2400 volts with direct current no further gain is possible because of the increased cost of rolling stock. Passing on, however, to the use of alternating current, he shows that much higher voltages may economically be utilized. This is indeed a beam of welcome light from one who has been regarded as a d.c. partisan. For a number of years there have been those who have attempted to minimize the large economic advantages which a high voltage a.c. system made possible. I cannot, therefore, but be pleased to have had Mr. Parshall announce his later convictions as to the possibilities of the a.c. system.

There are, however, other statements in Mr. Parshall's article to which I cannot so fully subscribe. He states "the energy losses in distribution conductors of a given section vary with the cube of the distance between substations." While this is true, its statement in this manner obscures a more important truth, namely, that a change in the substation spacing, while varying the energy losses between individual substations as the cube of the distance, varies the energy losses in the total system as the square of the distance between substations. Why use this new flower, the "cube rose" in our mathematical garden, which applies only to part of the problem, when the good old "square" serves the whole?

It is unfortunate that Mr. Parshall should lay such stress upon the influence of the density factor in deciding the substation spacing for, after all, this factor has nothing to do with the economic result. If in any given situation the correct substation spacing has been determined, then for, say, twice the density of traffic the same number of substations may again be the most commercially efficient solution. With a given train density the correct spacing can be found by separately plotting as abscissas the yearly operating and fixed charges for both line and substation, with the number of substation intervals as ordinates. Two intersecting curves would be formed and obviously the most commercially efficient result is shown at that point where the sum of the line and substation yearly charges is a minimum. If a proper balance has thus been struck between substation and line charges, then the increased traffic would necessitate both increased line and substation capacity and charges, but not necessarily the shortening of the distance between substations.

There is a further point. I note that Mr. Parshall shows the correct substation spacing for 2400 volts, under certain conditions to be 16 miles, and that for the single-phase system at 5000 volts, the spacing is again only 16 miles. This is a very surprising conclusion to reach, since apparently it implies a power factor for the single-phase system of from only 40 per cent to 45 per cent, or little more than half of that which would obtain in actual practice. However, lacking details of the exact conditions upon which Mr. Parshall has figured, it is difficult to do more than say that so far as I know no conditions have ever obtained in practice which would justify such a conclusion. Such experience as I have had, and what I can gather of the conditions with which Mr. Parshall is dealing, would lead me to suppose that the single-phase substation spacing for this voltage would be in the neighborhood of 21 miles, instead of the 16 miles given by Mr. Parshall, and that an increase to 15,000 volts would increase the substation spacing to 43 miles, or more than two and one-half times that for 2400 volts.

Advancing the thought still further, I would point out that the cost of one of these a.c. substations is on the order of one-sixth that of a d.c. substation, and further that it requires practically no attendance; so that on Mr. Parshall's own showing, a 15,000-volt a.c. substation at one-sixth of the cost will replace more than two and a half 2400-volt d.c. substations. The comparative economic net efficiency of a.c. and d.c. substations is therefore on the order of at least 15 to 1, even leaving out of consideration the difference in the yearly operating charges.

WILLIAM S. MURRAY,
Consulting Engineer.

The Code of Principles and Publicity

THE AMERICAN RAILWAYS COMPANY

PHILADELPHIA, PA., Dec. 16, 1914.

To the Editors:

I have your recent letter asking that I write you something with reference to the Code of Principles. The code is so elementary and at the same time so fundamentally sound, that the principles become almost axiomatic. It is, therefore, rather difficult to enlarge upon them without seeming to be arguing in favor of that which is obvious. At the same time, you will find in the industry someone who will, in the strictest confidence possibly, dissent from these principles in some particular; and if the inquiry were pushed far enough, you would doubtless find a sufficient number of individuals among whom someone would dissent from practically every article of the code.

Either by design or through a happy coincidence, the Code of Principles contains ten articles, and they might be likened to the ten commandments of the business. It is just as important that the electric railway operator should get these ten articles thoroughly engraved upon his understanding and that he should guide his conduct thereby as it is that the individual should be guided by the decalogue.

To my mind at this time, probably, the most important of these principles is the tenth, and it is the one from which, I fancy, there will be the most general dissent. Publicity is not as generally understood as it should be, and a number of companies have had unfortunate experiences with so-called publicity. An electric railway has as much right to expect results from publicity designed and put out by an amateur as a great department store might expect to get results from the same kind of advertising. The merchant has a message to deliver to the public, and he has found by experience that it is economy to employ competent persons to prepare that message and place it before the public, and he therefore employs a skilled advertising man. A public utility, which has a message to deliver to the public, sometimes employs a skilled man who can deliver

the message with a punch and sometimes entrusts it to someone already in the office. In the latter case the message usually lacks the punch because the railroad man is a railroad man; he knows the facts and he presents his message to the public in a manner which the public doesn't understand, or he fails to emphasize a salient point, or he overburdens it with detail.

Several years ago I had a message that I wanted to get from our company to the public, and I took occasion to embody it in an address I made before our employees' beneficial association. It was duly published in the daily papers of the city, and I don't think it made even a scratch, much less a dent. A short time after that we employed a publicity agent in another city, and in getting together material for him to work with he was shown a newspaper report of this address. He remarked that it was full of excellent material, but that I had used up in one publication enough material to last a campaign of from six to eight weeks. He then proceeded, in the other city, to take identical material relative to that property and conduct such a campaign, and the campaign was successful. This merely by way of illustration and to enforce the point which seems to me should be my contribution to this discussion, that publicity is the important thing at this time, because the events of last November show that the public mind is wavering and is in a receptive condition. The time is therefore opportune to get before the public our side of the story, but it must be done by men who know how to do it and who can put the necessary punch in their statements.

C. L. S. Tingley,
Second Vice-President.

Importance of the Public Library to Railway Men

Free Public Library
New Haven, Conn., Dec. 3, 1914.

To the Editors:

It seems to me that the editorial which appeared in the issue of the Electric Railway Journal for Nov. 28, 1914, page 1188, entitled "Electric Railways and Public Libraries," should tend to bring about a closer spirit of co-operation between these two fields. As the editorial states, the present-day librarian is rapidly breaking away from the attitude of the man of the past who, like a former librarian of Harvard College, sighed a sigh of great relief because he had all of his books in the sanctuary. It is not so much that our work here is an activity peculiar to New Haven, but rather that it is a direct reflection of the signs of the times. That our activities are taken up with the electric railway industry is due, no doubt, to the fact that the librarian has given me free use of my power as head of the department and, like electricity, I moved in the line of least resistance. Being more or less familiar with the electric railway industry I felt better qualified to cooperate with the men in this line than with those in lines less familiar.

That the Electric Railway Journal has so kindly offered to act as a clearing house for discussion of the relations of the public library to the electric railway industry will, I am sure, be greatly appreciated by librarians at large as well as by the members of the industry in which the paper is such a valuable organ.

In my mind the public library of a given size can play a most important part in the conducting of a transportation company inasmuch as it is the storehouse for printed material, whether in book, pamphlet, periodical, transaction, clipping, photograph or even manuscript and excerpt form. These all pass through the librarian's hands and they represent much valuable material. If railway men realized this fact the material could easily be made very useful.

I trust that we, the public libraries, will not fail to realize our splendid opportunity to help such a large and most important industry as electric railroading.

Kenneth C. Walker,
Head of the Department of Technology.

"Poisoning the Wells"

Drexel Institute
Philadelphia, Pa., Dec. 15, 1914.

To the Editors:

The editorial "Poisoning the Wells" in the Electric Railway Journal of Dec. 5 is well put. It is so common for newspaper people at least to read greed and selfishness into anything originating with public service companies that it is probably wise to take the space which is devoted to this editorial for its particular purposes. One fault I find with it is that it calls attention to an article in *The New Republic*, which probably few people have seen or read.

So many college men go into the employ of government, municipalities and public service companies, while so few get any training worth while in practical economics, that no overestimate is likely to be made of an inter-relation planned to put into the hands of faculty and students information on public service relations which the public service companies have at their command, but which has been difficult to reach heretofore. Their willingness to co-operate is, of course, one of the signs of the times and shows an enlightened cooperative spirit which is certainly to be admired.

The need of more and better training in practical economics for technical students is slowly beginning to be recognized. May nothing arise to interfere in the least with the formation of closer bonds between educators and men of wide experience in public service relations.

I sometimes wonder at the patience which such men exhibit, since their motives are so constantly misinterpreted and their purposes maligned. I suppose there must be some rascals connected with public service enterprises, but I have not personally met any of them. I must, therefore, believe in the sincerity and honesty of purpose of those who manage these great enterprises, and particularly believe in the committee of the American Electric Railway Association which drew up the "Code of Principles."

Arthur J. Rowland,
Dean.

Cost of Hand-Throw Signals

Nachod Signal Company, Inc.
New York, Dec. 14, 1914.

To the Editors:

In your issue of Dec. 12, in the proceedings of the Pennsylvania Street Railway Association, we note that one of the speakers is reported to have said "in times of rigid economy, the old hand-throw signal of five lights in series would be the most advisable system."

It may not be generally known what the apparently small amount of time lost at each turn-out due to the use of hand signals amounts to in a year. For example: Consider one turn-out on a single-track line having a twenty-minute average headway during the twenty-four hours, then cars would meet there every ten minutes, or 144 times a day. If we assume only fifteen seconds lost due to the operation of throwing hand signals, which seems to be a very conservative estimate, this amounts in a day to thirty-six minutes, or six-tenths of an hour. If the wages of the car crew

are 25 cents per hour, then the time lost for the four men costs 60 cents per day, or $219 per year of 365 days.

Since automatics to replace the hand signals cost not much over $400 per block installed and have a low maintenance charge, it is easy to see that the automatic signals would save their cost in about two years. Furthermore, the saving effected by the automatics has been figured on the wages of car crews alone, which is of course only one of the items involved.

CARL P. NACHOD,
President and Chief Engineer.

Maximum Motor Input

TRANSIT DEVELOPMENT COMPANY
BROOKLYN, N. Y., Dec. 8, 1914.

To the Editors:

Referring to the communication from William A. Del Mar, printed in the issue of the ELECTRIC RAILWAY JOURNAL for Dec. 5, page 1254, relative to the maximum input in railway motors, discussed by the railway section of the standards committee of the A. I. E. E., it is my opinion that the maximum input of a railway motor should be such that it will be capable of carrying a load of twice the nominal rating for one minute at the rated voltage, without flashover or injurious sparking at the brushes. I do not believe it necessary that this period be as long as five minutes for the average and possibly more than average conditions in this country.

I believe, further, that since the tapped-field motor is coming into quite general service and is applicable to a very large percentage of railroads throughout the country, the definite rating should be specified for such type of motor, in which case I am of the opinion that to properly protect the motor from injury, it should have the rating mentioned above for use when operating on full field, and it should withstand a swing for ten seconds of three times its nominal current rating at the rated voltage without flashover or mechanical injury or injurious sparking at the brushes.

WILLIAM G. GOVE, Superintendent of Equipment.

NEW YORK, Dec. 15, 1914.

To the Editors:

The subject of motor overloads referred to in the communication from William A. Del Mar, printed in your issue of Dec. 5, seems to me to take up a matter which very few persons are really qualified and competent to pronounce upon. I would expect that circumstances would alter cases to a considerable extent. As Mr. Del Mar correctly points out, the manufacturers and the users of railway motors have different points of view in regard to overload capacity. There is something to be said on each side. Under these circumstances I think that it would be difficult, if not impossible, to settle the matter definitely until there are more results of experiments and tests available. Until this time a provisional compromise on the matter is all that can be expected.

C. O. MAILLOUX,
Consulting Engineer.

ALLIS-CHALMERS MANUFACTURING COMPANY
MILWAUKEE, WIS., Dec. 15, 1914.

To the Editors:

Referring to Mr. Del Mar's communication on "Motor Overloads," I would say that the proposed section of the Institute rules referring to railway motors as it stood in the preliminary edition would work against the interests of the manufacturers who have a stock of non-interpole motors on hand.

It would be unreasonable, as a commercial proposition, to expect a non-interpole motor to withstand the tests specified. There are many classes of service where the use of the interpole motors is not required or justified.

It would seem to the writer that the proposed section should be split up under two headings, namely, interpole railway motors and non-interpole railway motors. The railway company's specifications should state the requirements which will determine whether interpole motors are necessary or not.

H. W. CHENEY,
Engineer Electrical Department.

[NOTE.—The section referred to in these three letters is No. 418 in the A. I. E. E. standardization rules. As it appeared in the preliminary draft approved tentatively by the board of directors on July 10, 1914, it read as follows:

"418. *Maximum Input.* Railway motors shall be capable of carrying twice the current corresponding to their normal rating for a period of five minutes, without flash-over or mechanical injury. They shall also be capable of carrying a load of three times their nominal rating for one minute under the same conditions. These overloads shall be applied when the motor is at the temperature which it would acquire when operating at its continuous rating."

As revised by the standards committee and as it will appear in the regular edition of the rules now in press this section reads: "The subject of overloads for railway motors is under investigation."

As the preliminary form of the rule has been already published in at least one important book it is well to direct attention to this significant emendation.—EDS.]

Functions of the Company Section

WASHINGTON RAILWAY & ELECTRIC COMPANY
WASHINGTON, D. C., Dec. 12, 1914.

To the Editors:

By way of comment on your editorial of Nov. 28, entitled "Functions of the A. E. R. A. Company Section," I send the following:

AN ASSOCIATION ACROSTIC

The functions of a company section may be expressed in a few words as follows:

They stimulate and promote:

A.mbition	Co-operation	Sociability	Many
E.ducation	Opinions	Entertainment	Opportunities of great
R.eliance	Mentality	Congeniality	Value, which with
A.dvancement	Publicity	Thought	Enthusiastic support
	Ability	Interest	Means much to
	Notoriety	Originality	Electric railway companies
	Your ideas	New conceptions	Now and in The future

This little acrostic seems to me to contain references to most of the benefits which accrue to us as members of a company section.

GEORGE G. WHITNEY,
President Company Section.

The Jones System of Control

PITTSBURGH RAILWAYS COMPANY,
PITTSBURGH, PA., Dec. 10, 1914.

To the Editors:

I notice in your issue of Dec. 5 an article by C. W. Squier explaining the control used in Pittsburgh. You may be interested to learn that in a recent patent (issued Sept. 1, 1914) further improvements have been made in the control, and under the new system there are never fewer than three motors in use. We still have one of the original equipments in use with the connections as they seem to be explained in Mr. Squier's article, but we early found that we could increase the

acceleration of the car on bad track and on grades by a slightly different arrangement of connections beyond the series-parallel position. Fifty-five cars are now in operation here equipped with these controllers built in our own shops, and 100 additional equipments, on which delivery is now beginning, are being manufactured for us. This control is applicable to other than the baby motors, as we have used it with four standard 50-hp motors.

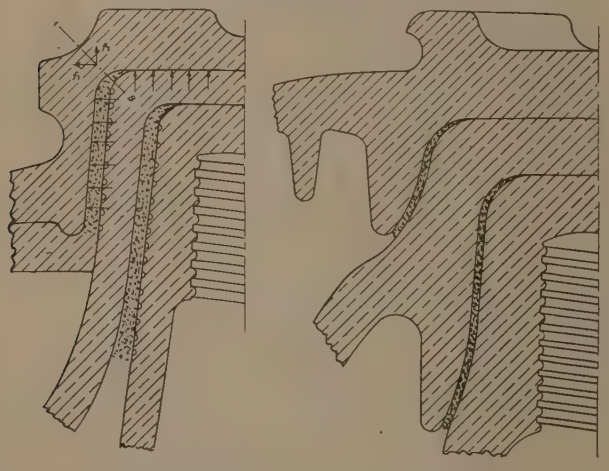
The new control, together with small motors and 24-in. wheels, saves 20 per cent to 30 per cent in power consumption, depending upon the type of city equipment with which it is compared.

The motors and trucks weigh 4½ tons to 5 tons less than the usual trucks and quadruple equipment of four 50-hp motors in use in many cities. The saving due to the controller is 10 per cent in energy for typical city service, and where there is much wagon traffic the slow speed with all motors in series is of great benefit.

P. N. Jones, General Manager.

High-Tension Power Transmission Problems Discussed at December A. I. E. E. Meeting

At the regular monthly meeting of the American Institute of Electrical Engineers, held in New York on Dec. 11, papers were presented by A. O. Austin, chief engineer Ohio Insulator Company, on "Insulator Depreciation and Effect on Operation," and F. W. Peek, Jr., consulting engineer General Electric Company, on "Effect of Altitude on the Spark-Over Voltages of Bushings, Leads and Insulators." Mr. Austin stated that some lines operate for years without insulator troubles only to run into serious and increasing trouble. This is usually attributed to fatigue in the insulator, but it



HIGH-TENSION PROBLEMS—FIG. 1—PIN-TYPE INSULATOR OF OLDER FORM—FIG. 2—NEWER FORM, PRACTICALLY LIGHTNING PROOF

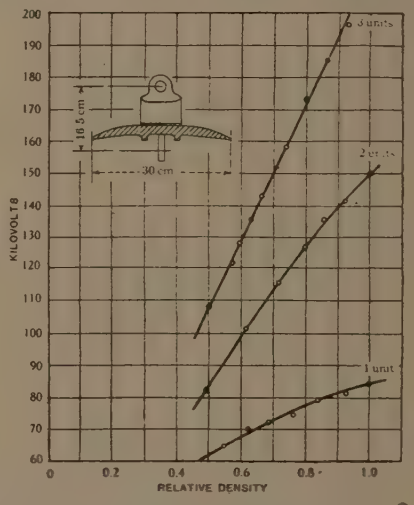
may be due to one or more of a number of causes. Examination of fractured pin insulators show that there must have been strong radial forces which split the outer parts, or sheared the heads of the cylinders from the side walls. These results appear to be due to high stress rather than to long-continued low stress, and they are probably due to uneven expansion from varying temperature, and to expansion of the cement. Porcelain is a poor conductor of heat so that, when suddenly cooled, say by rain, severe stresses may be set up, possibly producing cracks.

In Mr. Austin's opinion temperature differences do not account for all insulator failure, for insulators sometimes fail in storerooms and other protected places. Troubles usually develop at railway crossings first where it appears that sulphur fumes in the smoke attack the cement and produce crystalline growth, presumably of calcium sulphate, with consequent expansion. Microscopic examination sometimes shows such crystals. Little attention has been given to this complicated subject as the operating conditions are difficult to reproduce experimentally.

In illustrating the general principles of insulator design, Mr. Austin used the diagrams shown in Figs. 1 and 2. Fig. 1 represents a cross-section of part of a pin-type insulator with which trouble was experienced from cracking, particularly along the line *AB*. The directions of the forces are shown by the arrows, the resultants being represented by f_1 and f_2. Fig. 2 shows a section of a later type of insulator in which the stresses, due to uneven heating or cement expansion, are less, while the strength of the parts resisting them is greater. Refinements in the cement or the use of an elastic varnish or wax on the ends of the shells, while desirable in the older type are unnecessary in the newer one. A new process of sanding the porcelain surfaces in contact with the cement is also used to avoid the use of grooves.

Mr. Austin also took up the general subject of insulator depreciation, calling attention to the fact that with modern insulators there is little to be feared from static punctures in comparison with other dangers. Trouble comes not from the depreciation of the insulator as a whole, but from the matching up of defective parts in a single insulator or string. He gave a mathematical demonstration based on the theory of probability showing the relation of the rate of depreciation and the probability of the occurrence of bad strings of insulators under different conditions.

Mr. Peek's paper contained a wealth of experimental data, secured by testing various high-tension insulating devices under varying atmospheric pressure, presented in tabular and graphical form. Fig. 3 is typical of the illustrations. It is impossible to present a digest of these data in a few words.



HIGH-TENSION PROBLEMS—FIG. 3—ARC-OVER VOLTAGES AT VARIOUS DENSITIES

In the discussion which followed the presentation of the papers, Dr. Steinmetz urged the development of a systematic method of testing insulators on the line with or without removing the voltage. Mr. Peek suggested a more accurate use of the expression "high frequency" which is now applied to alternating quantities, wave trains and impulses of short duration. He hinted at some interesting data soon to be available on the effects of high-potential impulses of extremely short duration, say one millionth of a second, upon insulators. Mr. Peek also explained why more insulator failures occur on low-tension than on high-tension lines, this being due to the lower arc-over voltage of the former which are subjected to the same lightning voltages. He also advocated more rigid inspection of insulators and the rejection of all when more than 2 per cent fail under test.

American Association News

List of Committee Chairmen Announced—Several Committee Meetings Were Held Last Week, Including Those of Two Important Joint National Committees—A. E. R. A. Arrangements for the Mid-Year Meeting

CHAIRMEN OF COMMITTEES, 1914-1915

Following are the lists of chairmen of the several associations. Lists of the members of the committees will follow as soon as they are complete. It is expected that preliminary reports of all committees will be completed in time for presentation to the executive committee at the American Association meeting at Washington on Jan. 29, 1915.

AMERICAN ASSOCIATION

Subjects—C. L. Henry, president Indianapolis & Cincinnati Traction Company, Indianapolis, Ind.; insurance—H. J. Davies, secretary Cleveland Railway, Cleveland, O.; education—H. H. Norris, associate editor ELECTRIC RAILWAY JOURNAL, New York, N. Y.; federal relations—Arthur W. Brady, president Union Traction Company of Indiana, Anderson, Ind.; taxation—T. W. Wilson, vice-president and general manager Wilmington & Philadelphia Traction Company, Wilmington, Del.; compensation for carrying United States mail—Captain A. R. Piper, general freight agent Brooklyn Rapid Transit Company, Brooklyn, N. Y.; public relations—Thomas N. McCarter, president Public Service Railway, Newark, N. J.; to consider relations with state and sectional associations—R. P. Stevens, president Mahoning & Shenango Railway & Light Company, Youngstown, O.; *Aera* advisory—H. C. Donecker, assistant general manager Public Service Railway, Newark, N. J.; company membership—James E. Gibson, general superintendent Metropolitan Street Railway, Kansas City, Mo.; company sections and individual membership—Martin Schreiber, engineer maintenance of way Public Service Railway, Newark, N. J.

Electrolysis—Calvert Townley, chairman board of directors Lackawanna & Wyoming Valley Rapid Transit Company, New York, N. Y.; ways and means—J. H. Pardee, president J. G. White Management Corporation, New York, N. Y.; 1915 convention—J. D. Mortimer, president Milwaukee Electric Railway & Light Company, New York, N. Y.; award of bronze medal for best paper presented before a company section—Oscar T. Crosby, Warrenton, Va.; relations with manufacturers' association—C. L. Henry, president Indianapolis & Cincinnati Traction Company, Indianapolis, Ind.; special committee on membership—L. S. Storrs, president Connecticut Company, New Haven, Conn.; to confer with other organizations regarding meeting dates—H. C. Clark, editor *Aera*, New York, N. Y.; to represent the association at the American Good Roads congress—E. C. Faber, second vice-president and general manager Aurora, Elgin & Chicago Railroad, Wheaton, Ill.; arrangements for mid-year conference and dinner—C. L. Henry, president Indianapolis & Cincinnati Traction Company, Indianapolis, Ind.; valuation—L. S. Storrs, president Connecticut Company, New Haven, Conn.; standards for car loading—S. W. Huff, vice-president Brooklyn Rapid Transit Company, Brooklyn, N. Y.; Anthony N. Brady medal—Arthur W. Brady, president Union Traction Company of Indiana, Anderson, Ind., and 1915 transportation committee—J. H. Pardee, president J. G. White Management Corporation, New York, N. Y., master of transportation.

TRANSPORTATION AND TRAFFIC ASSOCIATION

Rules—W. H. Collins, general manager Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y.; passenger traffic—P. P. Crafts, general manager Mobile Light & Railroad Company; express and freight traffic—F. D. Norviel, general passenger and freight agent Union Traction Company of Indiana, Anderson, Ind.; fares and transfers—J. E. Duffy, general superintendent New York State Railways, Syracuse, N. Y.; training of transportation employees—Cyrus Ching, chief instructor Boston Elevated Railway, Boston, Mass.; transportation-accounting—Joseph K. Choate, vice-president J. G. White Management Corporation, New York, N. Y. (co-chairman); block signals—J. W. Brown, assistant general superintendent Public Service Railway, Newark, N. J. (co-chairman); standards—L. H. Palmer, Harrison Williams, New York, N. Y.; to develop uniform definitions—H. C. Donecker, assistant general manager Public Service Railway, Newark, N. J.; construction of schedules and time-tables—Alexander Jackson, superintendent schedules and time-tables Public Service Railway, Newark, N. J., and transportation-engineering—P. N. Jones, general manager Pittsburgh Railways, Pittsburgh, Pa. (co-chairman).

ENGINEERING ASSOCIATION

Power generation—J. W. Welsh, electrical engineer Pittsburgh Railways, Pittsburgh, Pa.; buildings and structures—C. F. Bedwell, assistant engineer Public Service Railway, Newark, N. J.; equipment—W. G. Gove, superintendent of equipment Brooklyn Rapid Transit Company, Brooklyn, N. Y.; heavy electric traction—E. R. Hill, consulting engineer Pennsylvania Railroad, New York, N. Y.; power distribution—A. S. Richey, Worcester Polytechnic Institute, Worcester, Mass.; electrolysis—A. S. Richey, Worcester Polytechnic Institute, Worcester, Mass.; transportation-engineering—R. N. Hemming, superintendent of motive power Union Traction Company of Indiana, Anderson, Ind. (co-chairman); engineering-accounting—Charles Rufus Harte, construction engineer Connecticut Company, New Haven, Conn. (co-chairman); life of railway physical property—Martin Schreiber, engineer maintenance of way Public Service Railway Company, Newark, N. J. (co-chairman); way matters—C. S. Kimball, engineer maintenance of way Washington Railway & Electric Company, Washington, D. C., and block signals—J. M. Waldron, signal engineer Interborough Rapid Transit Company, New York, N. Y. (co-chairman).

ACCOUNTANT'S ASSOCIATION

Express and freight accounting—E. L. Kasemeier, auditor Ohio Electric Railway, Springfield, O.; passenger accounting—L. T. Hixson, auditor Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., and to represent association at convention of railroad commissioners—W. F. Ham, vice-president and comptroller Washington Railway & Electric Company, Washington, D. C.

JOINT COMMITTEE ON ELECTROLYSIS

The sub-committee on publication of the national committee met for the first time at 29 West Thirty-ninth Street, New York, on Dec. 16 under the chairmanship of E. B. Katté, chief engineer electric traction New York Central Railroad. The committee met to consider the reports submitted by the other sub-committees which had been referred to it by the full committee at its last meeting. The present meeting was devoted

to organization and a preliminary examination of the data submitted. Members of the main committee have until Jan. 1 to submit comments on the sub-committee reports. After considering these the publication committee will submit the complete report to the full committee for final approval.

ARRANGEMENTS FOR MID-YEAR MEETING

Arrangements for the mid-year meeting of the American Electric Railway Association, to be held in Washington, D. C., on Jan. 29, 1915, are being perfected. A meeting was held at the New Willard, Washington, on Dec. 13, and was attended by C. Loomis Allen, C. L. Henry, C. C. Peirce, E. B. Burritt and H. G. McConnaughy of the committee of arrangements, and S. L. Colby of the Manufacturers' Association and J. N. Shannahan of the Transportation & Traffic Association. It was decided to hold the day sessions of the association as well as the banquet in the evening at the New Willard Hotel. The committee hopes in the afternoon of Jan. 29 to arrange for a reception of the delegates by President Wilson at the White House. If they are successful in this there will be but one business session beginning at 10 o'clock and lasting until the business of the association is finished.

All of the speakers for this session have not yet been selected, but they will include Col. T. S. Williams, president Brooklyn Rapid Transit Company, who will speak on the "Code of Principles," and N. C. Kingsbury, vice-president American Telephone & Telegraph Company, New York, who will discuss some features of publicity.

The committee anticipates a large attendance at this meeting and is making arrangements for special transportation so as to add to the convenience of those planning to be present. Probably special trains will be run from New York to Washington and return over both the Pennsylvania and Jersey Central-Reading routes. Actual leaving times will be announced later, but the trains will be planned to leave New York on the night of Jan. 28 and returning will leave Washington on Jan. 29 after the banquet. The committee hopes also to arrange for special cars from other cities like Chicago, St. Louis, Pittsburgh and Atlanta.

NATIONAL JOINT COMMITTEE ON OVERHEAD AND UNDERGROUND CONSTRUCTION

This committee held its first full meeting in New York on Dec. 16 with Farley Osgood, assistant general manager Public Service Electric Company, in the chair. R. D. Coombs, consulting engineer, New York, representing the A. R. E. A., is secretary. The American Association was represented by W. J. Harvie, of Allen & Peck, Inc.., while G. W. Palmer, Jr., Bay State Railway, and C. L. Cadle, New York State Railways, represented the Engineering Association. The meeting was addressed by J. J. Carty, chief engineer American Telephone & Telegraph Company, and E. B. Rosa, chief physicist United States bureau of standards, on co-operation between the telephone and other interests and on the work of the bureau respectively. The discussion brought out these facts, among others: That the purpose of the committee is to furnish a clearing house for information; that it will endeavor to prevent by its influence the independent action of one interest which might interfere with the rights of another; that the specifications for overhead crossings prepared by the predecessor of the present committee are being increasingly adopted by public service commissions; that it is not desirable that these specifications be incorporated into state laws, as they are always subject to revision, but that it is preferable that commissions base orders upon them "as revised." There are thirteen interests now represented in the committee of twenty-one members. Alternates to a number somewhat less than this will also be appointed.

COMMITTEE ON TRAINING TRANSPORTATION EMPLOYEES

This committee of the T. & T. Association met in New York on Dec. 17. Those present were Cyrus Ching, chief instructor Boston Elevated Railway, chairman; E. E. Strong, superintendent of transportation New York State Railways, and W. J. Harvie, Allen & Peck, Inc. The assignments made by the executive committee were considered and the chairman undertook to frame a set of questions which can be sent out to the membership to secure the necessary data for filling the assignments.

ANNUAL SMOKER OF COMPANY SECTION NO. 2

The annual social gathering of the Public Service Railway Company Section was held on Dec. 17 in Newark, N. J., with a large attendance. The secretary announced that the registration at the November meeting was 418 names, indicating the record attendance in the history of the section. The evening was spent in singing, smoking and listening to a vaudeville program furnished by professional entertainers. It closed with a turkey supper served in the company employees' dining room. President Maguire urged the inauguration of an "each-get-one-more" membership campaign.

The association was represented at the Good Roads Congress in Chicago this week by E. C. Faber, chairman of a committee appointed for the purpose, C. N. Wilcoxon and C. D. Emmons.

Committee on Uniform Crossing Agreements

This committee which had been appointed, at the request of the Pennsylvania Public Service Commission, to represent the Pennsylvania Street Railway Association on a joint committee on wire crossings, reported at the recent convention of the association that it had met with the joint committee in Harrisburg, Pa., on Nov. 16. It was then decided to draw up specifications for recommendation to the commission to supersede the present order covering this subject and a sub-committee was appointed for the purpose. Beginning Dec. 1 the sub-committee has followed the plan of holding weekly meetings in Philadelphia on Tuesdays pending the completion of its report. The Railway Association is represented on the sub-committee by G. E. Wendell, Vallamont Traction Company; Pittsburgh & Allegheny Valley Traction Company, and R. P. Stevens, Mahoning & Shenango Valley Railway & Light Company. The last-named is also chairman of the Railway Association committee.

United States Civil Service Examination

The United States Civil Service Commission has announced open competitive examinations for the following positions: Junior railway mechanical engineer, grades I and II; junior railway signal engineer, grades I and II; junior railway electrical engineer, grades I and II; junior railway civil engineer, grades I and II. The salaries, in each instance, are: Grade I, $1,200 to $1,680; grade II, $720 to $1,080. Persons desirous of taking either of these examinations should apply at once for Form 2039, stating the title of the examination for which the form is desired, to the United States Civil Service Commission, Washington, D. C. The examinations will be held on Jan. 20.

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

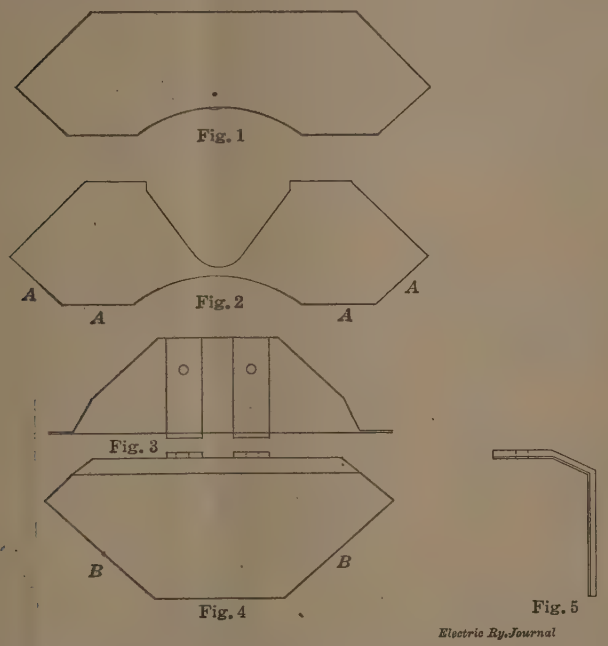
(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

Handy Templets for Assembling Brush-Holder Yokes for GE-57 Motors

BY J. N. GRAHAM, MASTER MECHANIC ROCKFORD (ILL.) & INTERURBAN RAILWAY

In assembling the parts of brush-holder yokes for some of the older types of railway motors it is sometimes difficult to get the positions of the castings on the body of the yoke absolutely correct. The accompanying illustration shows a set of templets which, if properly made and properly used, greatly simplify the making of these yokes. As the castings seldom are damaged in any way, they can be removed from blocks that are charred or otherwise damaged and again used on new blocks.

All templets are made of 1/16-in. blue annealed steel. Fig. 1 shows a plate cut out of the steel and used as a



DETAILS OF TEMPLETS FOR GE-57 BRUSH-HOLDER YOKES

pattern for marking out the blocks of well-seasoned hard maple which form the body of the yoke. After the blocks are cut to the proper size and shape they must be soaked for at least twenty-four hours in hot paraffine. Fig. 2 is a templet for setting the casting which holds the yoke to the motor frame, the edges *AAAA* of which are turned over for about 1 in. at right angles to the templet. The lip so formed acts as a guide to hold the templet in the proper position on the yoke while the holes are being marked for the rivets which hold the casting to the block. The space cut out at the top of the templet must fit the casting. This casting is then riveted to the block.

Figs. 3, 4 and 5 show three views of the templet used in placing the castings which hold the brush-holders on the block. This templet is bolted to the yoke at the point where the yoke is to be bolted to the motor frame through the holes shown in the cut. This plan allows the rest of the templet to lie against the face of the yoke, the lines *BB* being the inside edges of the castings which hold the brush-holders. This templet should be left on the yoke while the castings which hold the brush-holders are being riveted to the yoke. To assure the proper position of all castings, the templet should not be crowded out of place. This templet is reinforced with two pieces of ¼-in. x 1½-in. iron which are bent to fit over the outside of the templet and are riveted to the templet with conutersunk rivets to get a smooth surface.

The best way to make a set of these templets is to fit them to a new yoke that is absolutely correct. The different types of motors will require different sets of templets, as there is a difference in the size of the yokes. The ones shown in the illustration are used for GE-57 motors.

Economical Use of Wood and Preservation of Timber

BY E. W. BRIGHT, TIE AND TIMBER AGENT BOSTON ELEVATED RAILWAY

It is astonishing to see the saving that the consumer can make by the proper selection of the kind and quality of the wood for a particular class of service. First of all, it has been my experience in regard to specifications for lumber that very good results can be obtained by using the grading rules issued by the various lumber associations, and by careful study one can invariably find some grade that will meet with his requirements.

The buyer must bear in mind that if he specifies certain widths or lengths that are not given in standard grading rules the material is going to cost more money. However, I know that conditions come up where it is advisable to order special widths or lengths. When material is ordered in this way it is a good plan to have it piled separately and marked "Special," for men at work around the mill will invariably go to a pile of lumber and pick out the best they can find regardless of how and where they are going to use material.

As to care of lumber, the material should be well seasoned as far as possible before it is used because it is a commonly accepted fact that dry timber will not decay nearly so fast as wet timber. It is therefore essential that all lumber should be piled properly and air spaced. This applies to lumber piled indoors as well as in the open. Where lumber or ties are piled in the open, bed blocks should be used to keep the material from the ground, and a slanting roof should be made over each pile to protect the material from the sun, rain and snow. Hardwoods and flooring should always be piled under cover, and all sheds housing lumber should be absolutely watertight, for to store material in a leaky building is far worse than to pile it out in the open.

WOOD PRESERVATION—METHODS AND QUANTITIES

The preservative treatment of timber is widespread, and each year sees it applied more extensively. I will not go into the different processes used in the treating of timber, but will give some idea of the Bethell process which, no doubt, is used more in the United States than any other process.

Under the Bethell process timber to be treated is placed on iron trucks or "cylinder buggies" and run into huge horizontal cylinders. These cylinders are capable of withstanding high pressure, and their doors are so arranged that they can be closed and hermetically sealed after the timber is drawn in. After the doors are closed live steam is admitted into the cylinders, and a pressure of about 25 lb. per square inch is maintained for several hours. After the vacuum period the preservative is run into the cylinder at a temperature of about 170 deg. Fahr., and the pressure pumps are started and are continued until the desired amount of preservative is forced into the wood. The surplus preservative is then blown back into the storage tanks, the timber is allowed to drip for a few minutes, the cylinder doors are then opened and the timber is withdrawn.

Many antiseptics are used in the United States, particularly zinc chlorid, corrosive sublimate (bichorid of mercury), and copper sulphate, but creosote (dead oil of coal tar) is used more than any other antiseptic. I think the best specification for creosote oil is that which was adopted by the American Railway Engineering Association at its thirteenth annual convention, held in Chicago in March, 1912.

In the treatment of lumber the pounds of oil to be used per cubic foot should be based in a measure on the quality of the timber to be treated and on where the material is to be used. In other words, we know that lumber with a great deal of sap will take more penetration that that which contains more heart. It is the writer's opinion that where one specifies a 10 lb. treatment for a 6 in. x 8 in. x 8 ft. hard pine sawn tie of standard quality, an 8 lb. treatment is sufficient for a tie that grades "merchantable" or "prime."

I have always maintained that the consumers of treated material have been specifying more pounds of oil to the cubic foot than is really required in the treatment of lumber. I understand that in experiments which have been made at the Forest Products Laboratory it was found that the amount of creosote usually injected into wood is from 20 per cent to 50 per cent greater than the amount actually required to prevent attack. As to the strength of treated timber, it is my opinion that creosoting does not directly weaken wood. I would refer the reader to Circular 39 issued by the Forest Service, which covers fully experiments on the strength of treated timber.

Timber to be treated should be thoroughly air seasoned. If, however, there is not time for this, the inspector in charge should decide with the superintendent of the creosoting plant the length of time the material is to be steamed. Care should be taken to remove all inner and outer bark from the material before treatment, as creosote oil will not penetrate through the inner bark.

The inspector should keep lumber of similar sizes and quality together as far as possible where the quantity of the oil to be used is the same. He should also see that the creosoting plant is in good operating condition. Leaky valves and pumps should not be permitted, and all gage scales should be accurate, with the pulleys and floats running free.

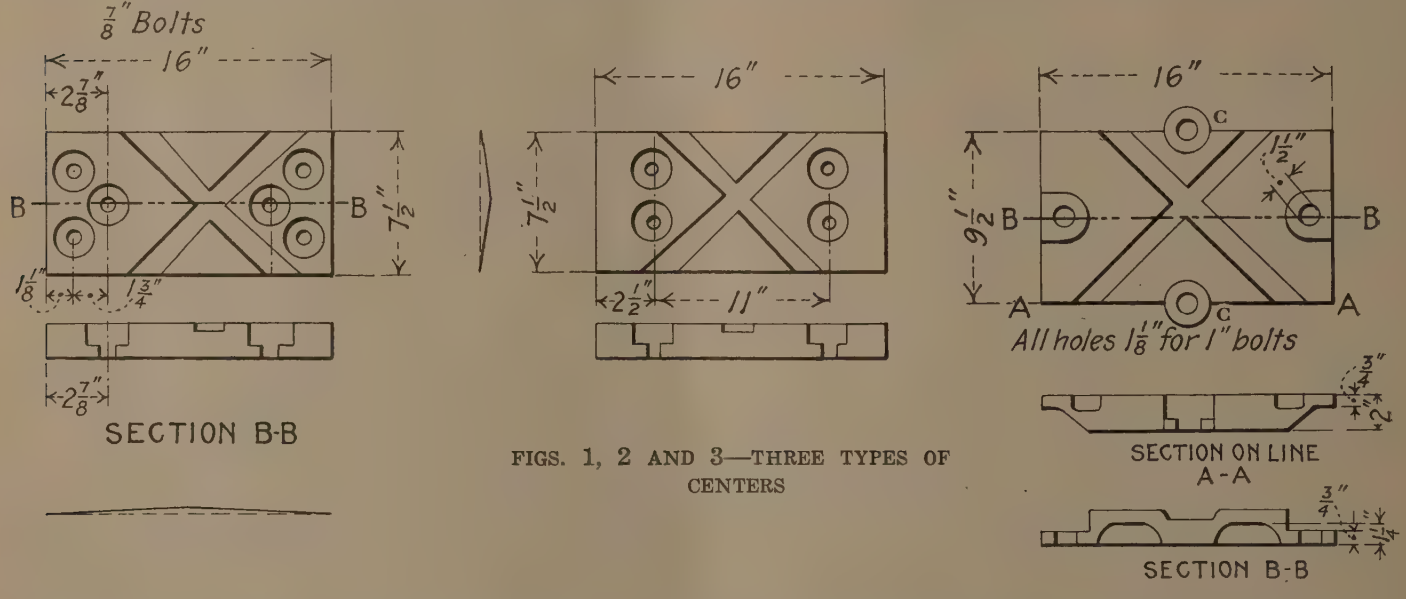
It is the duty of the inspector to take readings during the creosoting process, and occasionally he should take samples of oil from the cylinders to see if the oil comes up to the specification. After the vacuum period he should see that all valves to sap drums, drainage tanks, etc., whereby oil may escape from the cylinder about to be filled with oil, are closed.

Treated lumber or ties that have been on hand for some time should be used in preference to that which has just been treated, as treated material improves in strength by air seasoning.

The All-Babbitted Center

BY R. P. WILLIAMS, INSPECTOR OF SPECIAL WORK BROOKLYN RAPID TRANSIT SYSTEM

As the writer's statement in his article of Sept. 19 that the all-babbitted center, properly installed, would hold just as well as the partially-machined or the machined insert has been questioned by a correspondent, it may be worth while to present some further discussion based on fifteen years' experience with the babbitted construction.



FIGS. 1, 2 AND 3—THREE TYPES OF CENTERS

The writer believes that if the real reasons for the loosening up of centers had been thoroughly canvassed and eliminated, the machined types would never have come into existence. To illustrate, let us take three types of centers as follows: The center in Fig. 1 is held by six 7/8-in. bolts, and note the leverage. The two outer bolts are 1 1/8 in. from the edge; the middle bolts are each 2 7/8 in. from the edge. When this center is made of manganese and cold rolling takes place all of the strain is put on the center bolts, which invariably show the first signs of loosening. As one of these centers was found loose and broken, a new center of sixty-point carbon open-hearth hammered steel was substituted. It is three years since this installation was

made, yet the center is still perfectly tight. Many similar renewals have been made and none have loosened up. The center in Fig. 2 is held by four 1-in. bolts. We have 192 of these centers in 90-deg. crossings, only twelve of which have become loose. Note the position of the bolts, 2½ in. from the edge; yet in removing centers of this type on account of breakage, they have shown as much as ⅝-in. camber. This type is all manganese. Clearly there are two causes here which would not be removed by machining the bed, namely, the quality of the metal and the improper placing of the bolts.

These comparisons could be carried on with all of the keyed types, showing the same results. We have made renewals of the vertical and horizontal keyed types, using open hearth hammered steel in replacements, employing in every case the original method of holding. Although these experiments have been carried through four and one-half years and under every degree of traffic, we have yet to find the first loosened center.

As to the last center, Fig. 3, one would think from the almost even distribution of the holding-down pressure that the bolts would not loosen, but the reverse is the fact. Although held down by four 1-in. bolts, out of three crossings (forty-eight centers) not one has remained tight. The cause is plain: To reduce the amount of manganese metal the bearing area of the center has been corrugated, permitting peening action to such an extent that the light lugs at *CC* bend under the raising action. The center begins to pump and then nothing is left to do to save the crossing but to renew the centers and await the next loosening, for a center once loosened on account of peening can never be made permanently tight.

The writer is familiar with the construction of the partly machined and completely machined types, although he has had no experience in their up-keep. He has no doubt that a greater number will remain tight than in the case of the all-babbitted center, for the reason that more care has been given to the bolting. He does not believe, however, that renewals can be made permanent unless the work is followed very closely, for if the bearing surface is allowed to become worn, nothing is left to do but to make a complete renewal.

Equipment Defects—Control Apparatus and Connections—VI

BY C. W. SQUIER, E.E.

Increased Size of Motors for Rheostatic Braking.—The question is often asked as to how much it is necessary to increase the size of the motors when they are used for rheostatic braking in addition to propelling the car. Of course, this will vary with the service, but to illustrate how rheostatic braking may affect the size of the motors from a heating standpoint I have shown in Fig. 15 a speed-time curve and a curve plotted from the squares of the instantaneous values of current per motor for a car loaded weighing 14.75 tons, making a schedule speed of 9 m.p.h. with ten stops of eight seconds each per mile. The initial acceleration is taken as 1.6 m.p.h.p.s. and the average rate of braking as 1.5 m.p.h.p.s. The amount of heating of the motors in service is determined by the square root of the mean square motor current and the average voltage on the motors. The value of this average or mean square current is determined from this curve by dividing the area under the curve in (amperes per motor)^2 — seconds by the time of the run, including the stop in seconds, and taking the square root of this value. In this case it is found that a mean square current of 42.4 amp per motor is required to propel the car, and as the motors are also used for producing the stop by rheostatic braking, this average current will be increased to 54.4 amp per motor, or an increase of 28.3 per cent in the value of the heating current.

In deciding on a motor to do the work as outlined hereinbefore it is found on referring to the rating for several sizes of standard motors that a 55-hp motor has a continuous rating of 46 amp. This motor would be large enough for this service provided rheostatic braking was not used, but with rheostatic braking we should have to choose a 75-hp motor which has a continuous rating of 55 amp. It is thus seen that in this particular case the motors have to be 36 per cent larger when used with rheostatic braking than if they were used only to propel the car.

High Voltages and Skidding of Wheels.—Motors used for braking are also subjected to greater voltage peaks than would otherwise be the case. In some tests peaks as high as 2000 volts were recorded while using the motors to furnish power for electric brakes. Also with the car traveling at a high rate of speed, the motorman when required to make an emergency stop will be quite likely to throw this controller handle right around to the last braking notch, with the object of stopping the car as rapidly as possible. This results in a very high current in the braking circuit and in the development of an enormous retarding torque by the motor armatures so that the wheels are often badly skidded. To prevent these troubles the British Westinghouse Electric & Manufacturing Company has developed a device for automatically shunting the field current of the motors when certain predetermined limits are reached, and by this means the voltage generated by the motors is kept down to approximately that for which

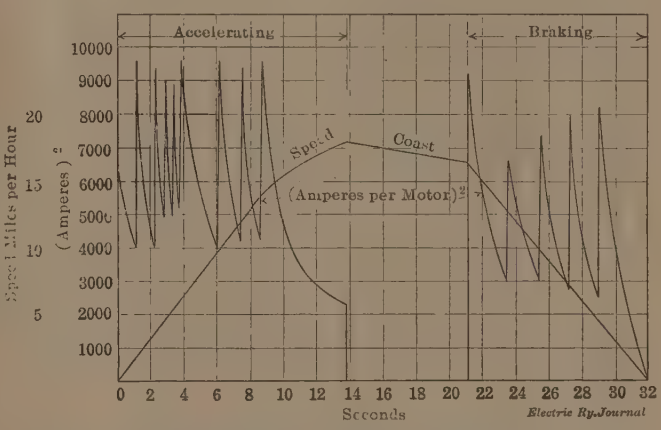


FIG. 15—SPEED-TIME AND POWER CURVES FOR A CAR USING RHEOSTATIC BRAKING

the machines are wound. This improvement effectually prevents the skidding which is produced in service when the motors act as generators.

Fig. 16 shows the connections for electric braking with this voltage regulator incorporated. Two solenoid switches *A* and *B* are connected in the braking circuit in series with the magnetic brake coils, and these switches close when the current in the brake circuit exceeds certain predetermined values. The windings of these solenoids are different so that switch *A* will close with less current through the circuit than is required to operate *B*. When these switches close they connect the resistances R_1 and R_2 in parallel with the fields of the motors. R_1 usually consists of about 0.4 ohm and R_2 of 0.2 ohm, but generally enough grids are provided to adjust the resistance to meet the service requirements. The switches themselves can also be adjusted to close at any required current merely by screwing or unscrewing a movable portion of the solenoid core, thereby altering the air gap for the mag-

netic circuit of the solenoid switches. This device is satisfactorily used on the Glasgow Corporation Tramways and the London County Council Tramways in connection with their electric brakes.

The amount of regulating resistance required when the motors are used for electric braking is appreciably more than is required for ordinary operation. Eight to

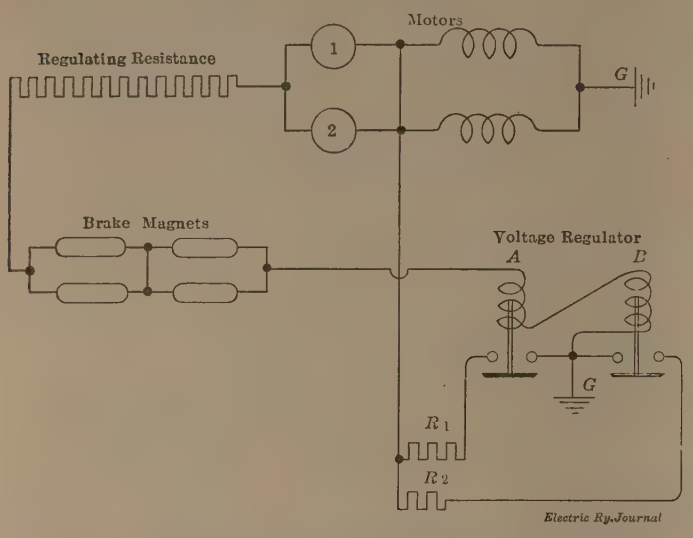


FIG. 16—CONNECTIONS FOR ELECTRIC BRAKING WITH VOLTAGE REGULATION

9 ohms are commonly used for equipments with electric brakes, while without electric brakes 4 to 5 ohms would be sufficient to give a good resistance stepping.

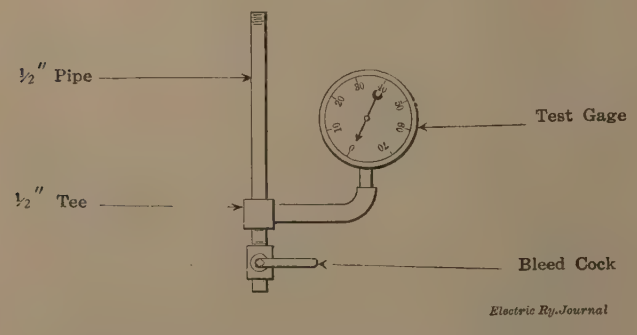
The General Electric Company's Type B controllers are specially arranged to care for electric braking. The power circuit connections of these controllers are the same as for that company's Type K controllers.

Device for Testing Air Gage and Governor

BY R. H. PARSONS, ELECTRICAL FOREMAN

A simple outfit consisting of a small test gage, bleed cock and a little pipe will be found to be of great value in testing the air gages and governor of a car. The ½-in pipe shown in the accompanying sketch is made to screw into the drain cock of the main air reservoir. After the attachment is made the drain cock can be opened and the air pressure will be indicated on the test gage.

A man who uses this device can check up the reading of the test gage with the platform gages without re-



DEVICE FOR TESTING AIR GAGES AND GOVERNORS

moving the latter, unless they are found to be incorrect. With the same means he can, from his testing station, bleed his main reservoir to check up the cutting-in and cutting-out points of the governor. Many cars are equipped with the governor beneath the car. In that case one man has the whole situation before him and can check and set his governor easily and accurately. The gage used should be of a high grade and should be tested at least once a week to insure accuracy.

Standard Aspects for Contact Signals

BY H. R. STADELMAN

No doubt all those who attended the Atlantic City Convention noticed the many exhibits showing American Electric Railway Association's standard signal aspect, and since the Street Railway Signal Company was the first manufacturer to use this aspect, the writer wishes to explain some of the reasons that led to its adoption by that company, aside from the important fact that it had been designed and recommended by the block-signal committee of the association.

Red, the indication for "stop" or "block occupied," is the most conspicuous of all colors and attracts the eye more quickly than any other. It is not dazzling, nor does it dim the sight by over-brilliancy. Because it stands out boldly against all surrounding colors, no matter what the atmospheric conditions may be, it is the safest color to use as a danger signal.

The use of yellow in combination with red for a permissive indication, or "proceed with caution," is generally recommended by signal experts and color scientists owing to the prevalence of color blindness with regard to red, so that yellow in combination with red becomes a positive, distinctive, unmistakable indication.

Green has become generally known as a clear indication. There are several reasons for this, primarily because it marks a positive difference between the signal light and existing neighboring lights, the latter being white in nearly all cases. Then, too, green is nature's own color, and is therefore a safe color for the eye to rest upon for a long time.

In railroad rules a dark signal is considered to be a danger signal, and a motorman coming up to a signal that displays no indication should bring his car to a stop and be governed by his operating rules. If the indication is green as the motorman approaches the signal, and it changes to red alone as he passes into the block, the contrast will be so great that he cannot help realizing that he should stop. If the indication changes to red with a staggered yellow, the indication is obviously proceed. For following movements in which the yellow changes to the opposite side of the red when the car enters the block, the red acts as a finder or marker, and the motorman has a positive indication that he has operated his signals.

With all-light signals it is true that, if a light burns out, there is no provision for an indication, but the lamps in the all-light signal may be installed, either two in multiple, or on a reserve relay, so that the probability of both being out at the same time is very remote. The writer wishes to take exception here to any claims that an electric lamp behind a lens is an inefficient indication. In the first place, a 110-volt, 35-watt lamp behind a 6⅜-in. green lens with efficient sunshades can be readily seen under most adverse conditions at a distance of 1200 ft., and when it is behind a red lens it can be seen 1500 ft. away. In fact, ranges of visibility of 1800 ft. and 2000 ft. respectively have been publicly advertised. In the second place, in actual tests on the Pennsylvania Railroad light indications could be seen when the semaphores were invisible owing to the distance, and because of this test this road is equipping its new electric division with all-light signals. With efficient sunshades no phantom indications or lights occur.

It is true that a semaphore stands out from its mast

clearly, but, in spite of this, steam railroads have found it necessary to shape the blades differently for different functions, a dovetail for caution, and a square or half round for stop, and some railroads do not even change the color of the blades at all, letting only the shape of the ends signify their meaning. When the writer was a repairman at a prominent tower on the Pennsylvania Railroad he had instructions to keep his signal lamps burning all the time because on a dark day the blades were not discernible. In consequence, the same indication for both day and night seems to be a thoroughly practical economy.

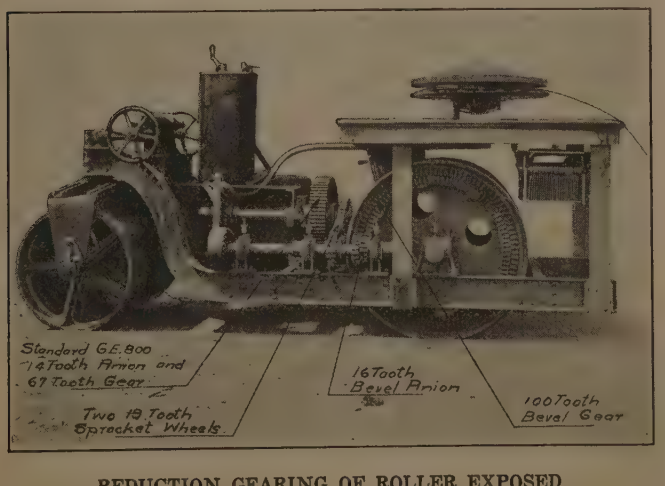
Electrically-Driven Road Roller at St. Louis

Through the courtesy of Richard McCulloch, vice-president and general manager, the following particulars are available on an electrically driven road roller which the United Railways of St. Louis has been using during the season of 1914.

A five-ton roller without steam engine, boiler or water tank was purchased from the Iroquois Engineering Works. This roller was equipped with a GE-800 railway motor geared down as indicated in one of the illustrations. The reduction in gearing is such that when the motor is running at its maximum speed the roller makes about 4 m.p.h. Current is conveyed to the motor through a duplex wire, one going to the trolley and the other to a contact on the rail. This duplex wire is kept taut by means of an automatic reel mounted on top of the roller. The roller is electrically illuminated besides being equipped with the usual oil signal lamps.

ELECTRICALLY-DRIVEN ROLLER RUNNING OVER MACADAM

The machine is used principally for rolling granite, brick or creosoted wooden block paving. It has also been used for rolling trenches in advance of track laying, although a heavier roller would be more satisfactory for this purpose. When rolling paving it requires, for its operation, a maximum of about 15 hp. It is simple to operate, an ordinary laborer being instructed in its operation within a few days. The electrically-driven roller has the following advantages over the steam-driven roller: No skilled mechanic is required for its operation; it is ready to run at a moment's notice; it requires no supplies, such as coal and water; it will not freeze up in the winter and it makes no dense smoke or noise on the street.



REDUCTION GEARING OF ROLLER EXPOSED

Auxiliary Contact Wire of Steel — Long-Life Pantograph Shoe

Excessive wear in the No. 0000 copper trolley wire installed on the 6600-volt, single-phase lines of the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind., made it necessary to install a No. 0000 steel auxiliary contact wire during the past summer. This wire was suspended 1¾ in. below the copper wire on 2-in. duplex clips. The old copper trolley wire had been in service more than seven years and would soon have required replacement. At the present time approximately 103 miles of steel wire is in service. It is used exclusively where the trolley wire is supported on mast-arm construction, but it is planned to test this construction also on span-wire suspension.

Following this change from copper to steel trolley wire, it was found that the greater rate of wear had been transferred from the wire to the No. 12-gage galvanized iron sliding pantograph shoes. In fact, it was possible to obtain only 2500 miles from each shoe before renewal was necessary. In seeking a remedy for this difficulty two pieces of half-oval mild steel, ⅜ in. x 1½ in. in section, were substituted for the 12-gage galvanized iron. This change has raised the useful life of the shoe to 9000 miles.

The two sections of half-oval steel 36 in. long are fastened with four rivets to the pantograph shoe frame which is made of ¾-in. x ¾-in. angles. In order to permit the steel contact wire to shift from these contact shoes to the frame and back again without catching, the ends of the half-oval pieces are given a long taper at each end. The average cost of the new shoes is approximately 15 cents for material and 30 cents for labor.

Electric Railways of Japan in 1912

The Japanese Ministry of Finance has issued the following data on the electric railways of Japan for the calendar year 1912:

The country possessed forty-four privately-owned installations totaling 432 miles of route, or 692 miles of single track, the construction cost of which was $44,295,000. About 133 miles of track were under construction, and in addition, thirty corporations with a combined capitalization of $14,255,000 had not yet begun operation. The municipally-owned systems, which are at Osaka, Tokyo and Kyoto, have built 116 miles of route or 209 miles of single track for $124,764,750, with another 66 miles of route under way. The operating statistics of the privately and publicly owned lines are presented in the accompanying table.

TABLE SHOWING STATISTICS OF ELECTRIC RAILWAYS IN JAPAN FOR 1912

	Privately Owned Lines	Municipal Lines of— Osaka	Tokyo	Kyoto	Tota
Systems	44	1	1	1	47
Route mileage	442	23	72	21	558
Single track mileage	635	45	143	21	844
Capitalization, yen*	89,180,000	26,079,359	82,796,100	10,379,212	208,434,671
Cars	1,392	413	1,211	119	3,135
Passengers	124,512,924	97,491,378	225,395,343	11,389,077	458,788,722
Passenger earnings, yen*	10,558,772	3,454,677	8,709,922	388,030	23,111,401
Other earnings, yen*	1,143,346	18,472	663,223	991	1,826,032
Operating expenses, yen*	5,573,621	1,779,003	3,856,624	280,549	11,489,797
Other expenses, yen*	1,189,813	18,890	55,997	3,497	1,268,197
Surplus, yen*	4,938,684	1,675,256	5,460,524	104,975	12,179,439

*A yen is worth approximately 50 cents.

Large Storage Battery Car for Cambria & Indiana Railway

A new 50-ft. storage-battery car, which marks an advance in meeting more effectively the requirements of service on light service branch lines of steam railroads, was put in operation on Dec. 9 on the 12-mile Colver Heights-Rexis line of the Cambria & Indiana Railroad, Colver, Pa.

By means of steam locomotives this railroad handles a large coal business. The lightness of passenger traffic on the line, however, has favored storage-battery propulsion, and for some time a battery car has been operated over the Colver Heights-Rexis section, making three round trips a day, with five intermediate stops per trip. With the acquisition of the new equipment the railroad may extend electric service to the remainder of the road, as well as to a proposed 4-mile extension for which a third car would be used.

The car is equipped to meet the peculiar feature of operation found on the 2¼ miles between Colver Heights and Colver, where a constant 5 per cent grade exists. The batteries are powerful enough in themselves to propel the new car up the grade, but as this would greatly reduce the possible mileage on one charge, 600-volt energy is taken on this section from an overhead wire. To delay corrosion from the exhaust gases of steam locomotives the trolley wire is offset. The trolley board, of course, is also offset.

CAMBRIA & INDIANA CAR—VIEW SHOWING POWERFUL STORAGE-BATTERY EQUIPMENT

The new Cambria & Indiana car has a much greater operating capacity than its predecessor, which was described in the Electric Railway Journal of Oct. 4, 1913. The length of the new car is 50 ft. or 15 ft. more than the old car, while its total weight, including trucks and battery equipment, is about 29.5 tons, as against 18 tons, the average loaded weight of the older car. The difference in weight is due mainly to the increased length of the car and its greater number of cells. The electrical equipment of the new car consists of 240 Edison A-12 cells for power and ten A-12 cells for lighting purposes, supplied by the Railway Storage Battery Car Company, and four Westinghouse 25-hp motors and control. The battery equipment weighs 14,000 lb. The batteries have a range of 130 miles on level track on a normal seven and one-half-hour charge, twice the distance possible under the same conditions with the older car. The maximum speed of the new car is 35 m.p.h.

The car body is mounted on Brill 69-E double-truck equipments with M.C.B. 33-in. wheels. These trucks are furnished with S.K.F. self-aligning ball-bearings. The car body, which was built by The J. G. Brill Company, is of steel up to the belt rail and has steel posts. It has a 32-ft. passenger compartment, a baggage compartment, space for smokers, partitioned section for the motorman and a toilet compartment. The total seating capacity is fifty-two. The car is heated by the Peter Smith forced hot-air system.

Reactive Factor Meters

Although instructed to keep the power factor of the circuits over which they have control as near unity as possible, switchboard attendants often maintain a power factor of 1 per cent or 2 per cent less than unity as being good and do not try to improve it. But computation and tests show that at 98½ per cent power factor the armature copper loss in the leading tap coils of a rotary is almost half again as much as at 100 per cent power factor. Under heavy load this is often enough to cause trouble in the tap coils. Also, the average heating in all the armature coils is about a quarter again as much at 98½ per cent power factor as at 100 per cent. The capacity of the rotary is therefore decreased considerably.

REACTIVE FACTOR METER

The measurements of "idle currents" is in general a recent development, wattmeters having been used recently so connected as to measure the idle volt-ampere, or "wattless component." The reactive factor meter, however, corresponds in its action to the power factor meter and bears the same relation to the latter that the "wattless component meter" bears to the "wattmeter." This meter indicates the sine of the angle of lag or lead instead of the cosine, as in the power factor meter. Unity power factor is, therefore, indicated as zero reactive factor.

If instead of the power factor meter there is on the circuit a reactive factor meter, a condition of 98½ per cent power factor is indicated as 17½ per cent reactive factor. The attendant consequently will be more on the alert and will be more likely to improve it. Power factor and reactive factor are equal at the value 70.7 per cent. At higher power factor, the load conditions are more conspicuously indicated on the reactive factor scale. At lower power factors the reverse is true. Reactive factor meters are therefore recommended for use only on circuits operating normally at power factors close to unity and which never fall below 70 per cent.

The Westinghouse Electric & Manufacturing Company's reactive factor meter, which has been recently introduced, operates on the rotating field principle like its power factor meters. A rotating field is produced in angularly placed coils connected in shunt with the metered circuits, one for each phase of the system in the case of polyphase meters. In their field is provided a movable iron vane or armature, magnetized by a stationary coil the current of which is proportional and in phase with that of the line current in one phase of the circuit. As the iron vane is attracted or repelled by the rotating field of the angularly placed coils, it takes up a position where the zero of the rotating field occurs at the same instant as zero of its own field. Thus its position indicates the phase angle between the voltage and current of the circuit. The reactive factor meter is then calibrated to read the sine of the angle indicated while the power factor meter is calibrated to read the cosine.

In the three-phase meter the rotating field is produced by three coils spaced 60 deg. apart; in the two-phase meter by two coils spaced 90 deg.; in the single-phase meter the rotating field is produced by means of a split-phase winding connected to the voltage circuit.

The meters are inclosed in round dust-proof cases, the type SI being 7 in. and the type TI being 9 in. in diameter. The entire pointer is visible so that readings

are easily made from a distance. No springs are used to control the movement or carry current, nor are there any moving coils, the construction thus being extremely simple. The meters are not influenced by external fields.

Highway-Crossing Protection by Trolley Contact Control

As instances of grade-crossing protection with control exactly adapted to the operating conditions some installations of Nachod highway-crossing signals on the Washington-Virginia Railway are interesting. In one case, on double track, the headway is thirty minutes during the day and fifteen minutes in the evenings. Trains are run in sections, as many as four or five cars following each other closely. The highway crosses at right angles and at a considerable grade, but the view is obscured by trees, brush and high banks on three of the corners.

The apparatus installed at this crossing consists of an iron pole with the sign, bell and relay attached, and the control box a part of the pole. The starting contactors, operated by the trolley wheels, are placed about eight poles from the highway in each direction on the corresponding track, and stopping contactors are located at the highway, there being four contactors in all. Flashing pilot lights are located three poles ahead of each starting contactor to indicate to the motorman that the bell is in operation. The control

HIGHWAY CROSSING PROTECTION—CROSSING SIGNAL WITH ANSWER-BACK PILOT LIGHT ON WASHINGTON-VIRGINIA RAILWAY

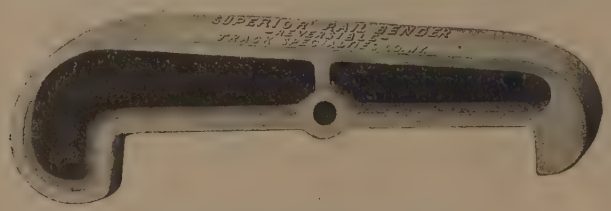
circuit, bell and lights are all tapped from the trolley wire, and no other source of power is used. The speed reaches a maximum of about 30 m.p.h. under the contactors, the bell ringing from twenty seconds to twenty-five seconds before the car reaches the crossing. The warning indication is given by a 12-in. bell, and a transparency also flashes the word "Danger," a connection from one of the series of lights in this transparency being run each way to the pilot light. Consequently, when the car passes the starting contactor the action of the bell is made apparent to the motorman by the flashing of the pilot light. This use of a flashing light as a "return indication" of the actual ringing of the bell has been favorably received by the railways, as it overcomes the objectionable condition of requiring the motorman to proceed upon only the assumption that the bell is ringing.

The transparency contains six 23-watt 110-volt Mazda lamps shunted by resistances, so that a failure of one lamp does not open the circuit of the remainder. The flashing of the lights is produced by a contact maker on the armature of the bell clapper. Because cars follow each other so closely over the crossing, a car-counting control was provided, so that the bell would not be cut out at the crossing until all the cars that have passed the starting contactor have also passed the crossing.

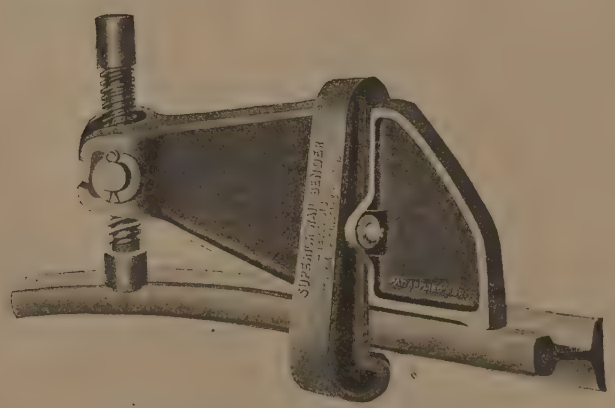
In another installation for a single-track crossing of a main highway where funerals and tourists' sightseeing cars pass frequently, cars follow each other closely at certain times of the day, passing every fifteen minutes. The starting contactors in this installation are about nine spans away from the highway, three contactors being used. The control in this case is both car-counting and directional, and the frequency of cars at this point involves the ringing of the bell for about one hour in the twenty-four. The bell and relay unit with bracket is mounted on an existing pole, and a separate danger transparency is hung by a bracket on the same pole. This transparency is novel as it consists of a sheet-iron sign with letters 12 in. high which are composed of small lens-like glasses with many facets, the letters showing white on a black background. The subdivision of the glass into a multiplicity of small units is a protection against malicious breakage and, like the military mast on a warship, would require many blows to demolish it.

Portable Rail Bender

A cast-steel rail bender which weighs but 150 lb. has lately been devised by the Track Specialties Company, New York. As shown in the accompanying illustrations, the principal feature is the reversible hook and swivel collar through which the screw passes. This



REVERSIBLE SWIVEL COLLAR



COMPLETE RAIL BENDER IN SERVICE

swivel collar maintains the screw perpendicular to the rail at all times. Merely by reversing the yoke the same bender may be used either as a right-hand or left-hand tool, a feature which is of particular service at the heels of frogs or at switches. The bender is sold under the trade name of "Superior."

The Philippine Board of Public Utilities Commissioners has decided that it has no jurisdiction over the so-called public utilities owned by a province or a municipality.

News of Electric Railways

I. C. C. REPORT

Recommendations of Commission and Parts of Report of General Interest to Electric Railways Reproduced

The twenty-eighth annual report of the Interstate Commerce Commission to Congress, dated Dec. 1, 1914, contains these recommendations:

That, for the purpose of uniformity and to prevent injustice, there should be provided by law one period—in our opinion three years—for the beginning of all actions relating to transportation charges subject to the act.

That there should be appropriate and adequate legislation upon the subject of control over railway capitalization.

That there should be legislation to make explicit and certain the authority of the commission to examine all correspondence, files, indexes, and other papers and documents retained by carriers subject to the act.

That the penalty for violations of the hours-of-service act be changed to a fixed and definite sum, or that a minimum penalty of $100 be established instead of the penalty of "not to exceed $500," as now provided.

That the use of steel cars in passenger-train service should be required, and that the use in passenger trains of wooden cars between or in front of steel cars should be prohibited.

The total expenditures of the commission for the year ended June 30, 1914, were $2,209,627.

Referring to the division of carriers' accounts the commission says in part:

"At the date of the last report a general revision of the accounting classifications for steam railways, electric railways, and express companies was in progress. This work has been completed and the revised classifications were made effective July 1, 1914.

"This general revision has been in the direction of development rather than change in principle. Additional accounts have been provided, instructions have been amplified, item lists extended, and the terminology simplified and made more descriptive. The grouping of accounts has also been so changed as better to show their relations. In the classifications of operating expenses for steam railways, electric railways, and express companies accounts have been provided for depreciation upon several classes of fixed property as well as equipment. The carriers are required to report to the commission the bases used by them in calculating depreciation. The revenues and expenses of certain auxiliary, or 'outside' operations of steam railways, heretofore shown separately in income account, are now combined with those of the main operations to which they are incidental, although they are still chargeable to separate primary accounts. The increasing use of electricity as an auxiliary in the operation of steam railways has been recognized by the addition of several new accounts.

"The system of accounts for electric railways has been completed by the addition of classifications of income, profit and loss, and balance-sheet accounts, and that of express companies by the addition of income and profit and loss accounts. The bulletin of accounting decisions under the former classifications for steam railways will be revised to conform to the new classifications and will be issued with additional cases. A similar revision of decisions under the electric railway classifications is in preparation.

"While much progress has been made during recent years in the practice of accounting by carriers, it is necessary to bear in mind that much remains to be done. A correct statement of assets and liabilities is not reached through recording merely the receipts and payments of money. So far as possible, account should be taken of the changes in values as they progress. Depreciation is not yet receiving adequate treatment by carriers. Repair expenses, which should be current, do not always appear in the period in which they accrue.

"An important administrative change in this division has been made since our last report. When organized, and for two years thereafter, the entire force of the division had its headquarters at Washington. On July 1, 1910, a branch office was opened at Chicago. During the past year additional branch offices have been established at New York, Philadelphia, Pittsburgh, St. Paul, St. Louis and San Francisco. Another will be opened at New Orleans. A force of resident examiners is attached to each branch office. An advantage expected to accrue from this change is increased efficiency through better acquaintance with local conditions at important railroad centers and in their vicinity."

In referring to judicial interpretation of the safety appliance act the commission says:

"In Spokane & Inland Empire Railroad v. United States, 210 Feb., 243, the Circuit Court of Appeals for the Ninth Circuit, affirming the judgment of the District Court for the Eastern District of Washington, held that the words 'used on street railways' as employed in the act of 1893, exempting such cars from the operation of the statute, do not include cars of an interurban line engaged in interstate commerce, even though they may be run for a short distance over the street railway tracks in order to reach a terminal in the center of a city."

Sixty-three train accidents were investigated by the Interstate Commerce Commission during the year ended June 30, 1914, forty being collisions and twenty-three derailments. The collisions were responsible for 108 deaths and 1162 injuries and the derailments caused 61 deaths and 972 injuries. The report says:

"Collisions caused by improper flagging continue to be a prominent feature of these investigations. Eight of the forty collisions investigated were due to this cause. In these eight collisions forty-five persons were killed and 386 injured. Attention has been called to the indefiniteness of the flagging rule in force on many roads, and to the practice of employing inexperienced men as flagmen." In one collision, due to improper flagging, which caused fourteen deaths and 294 injuries, the flagman at fault had been employed only twenty-four days and was entirely without previous railroad experience.

The record of accidents investigated shows a considerable decrease in the number of collisions due to the failure of enginemen to obey the indications of block signals. There were but two collisions of this nature during the past year, as against seven the previous year. The enginemen at fault were trusted employees of long experience and no adequate explanation can be given for these lapses from duty by trusted and competent men, who in many cases suffer death as a consequence of their error. It is to be hoped that the investigations authorized by the Congress may lead to the development and use of some system of automatic train control to be used in connection with existing signal systems which will eliminate this class of accidents.

The report adds: "The inherent weakness of the train-order system continues to manifest itself as a prominent feature of the accident record." Seven collisions were caused by trains encroaching upon the time of superior class trains and six were caused by the failure of trainmen to obey orders. On most roads where the train-order system is used the rules require that an order establishing a meeting point for opposing trains shall be sent simultaneously to all the trains involved, and also, whenever practicable, to the operator at the designated meeting point, thus providing a check against the possibility of trainmen forgetting or misunderstanding the order. This check, provided by the so-called "middle order," is an important element of safety in the movement of trains on single-track lines, but on some roads the rule which requires it to be used is not observed. Two of the collisions herein discussed, in which five persons were killed and three injured, could have been prevented by an observance of the rule, and in both cases the placing of a middle order was practicable.

In the report attention is again directed to the need of legislation requiring the standardization of operating rules. The efforts of the American Railway Association to standardize operating rules, while commendable, have not been wholly effective, for the reason that the association has no power to compel individual roads to observe its recommendations. The situation is similar to that which led to the passage of federal legislation enforcing uniformity in the application of safety appliances to cars and engines.

In previous annual reports the commission has called attention to bad conditions of track and roadway. No material improvement in such conditions is noticeable. Six of the twenty-three derailments investigated were either directly caused or greatly contributed to by bad track, and were responsible for 54 per cent of the deaths and more than 50 per cent of the injuries due to derailments from all causes. In at least three of these derailments, occurring in widely separated sections of the country, the track conditions were absolutely unsafe for the operation of trains at speed. Investigations of accidents caused by broken rails and fractured car wheels have confirmed the need for further investigation to determine with accuracy the stresses to which rails, car wheels and track structures are subjected under existing conditions of service, and to establish safe working limits for their use. The commission also renews the recommendation contained in its last annual report respecting legislation requiring the use of steel cars.

In connection with the authorization to investigate the use and necessity of block signal systems, appliances for the automatic control of railway trains and any devices intended to promote the safety of railway operation, an engineer-physicist and a signal engineer have been employed, and other employees of the commission have been also assigned to this work. Information has been received regarding experiments with train-control devices on several railroads, and in some instances official tests have been made. The total length of railroad line operated under the block system on Jan. 1, 1914, was 86,736.9 miles. The increase during the year 1913 was 2787.1 miles In previous reports the commission has recommended that railroads be required to adopt the block system.

The report shows the extent to which inspection of locomotive boilers has been carried out. In 1912, 74,234 boilers were inspected; in 1913 the number was increased to 90,346, and in 1914 it reached 92,716. During 1914 also 2141 defects to locomotives for which existing laws do not provide a remedy, 1155 of which were defective wheels, were reported by inspectors and brought to the attention of the railroad officials, with request that proper repairs be made.

In connection with the work of appraising the railroads of the country the report stated that the eight parties now at work in each district cover an aggregate of from 1500 to 1700 miles per month. It is believed that these same parties, by reason of increase in efficiency with experience, will soon be able to cover an appreciably increased mileage. It seems advisable not to increase the present force until methods of computing and assembling have been so far perfected that the result of these surveys can be placed upon the assembly sheets as fast as they are made. The preparation of inventories of telegraph and telephone lines has also been begun.

The commission says that beginning Jan. 1 next the most economical conduct of the work of valuation will probably require the increase of the field parties to from sixteen to twenty in each district. The opinion is expressed that the present general organization should be able to suppor twenty field parties, the cost decreasing in proportion as surveying parties can be multiplied without increase in overhead expenses.

KANSAS ARBITRATION

Board Decides Against Men, Except as Regards Sliding Scale—Award Lower than Company Offer

The board of arbitration selected to adjust the wage scale on the Joplin & Pittsburg Railway, Pittsburg, Kan., made its report on Dec. 5, to the effect that only the wages of platform men are to be readjusted. Following the settlement of the strike on the road on Sept. 24, after eighty days of idleness, an agreement was signed by the representatives of the local union and by officers of the company covering all points of difference except the wage scale. This matter was by agreement submitted to arbitration, the arbitration decision to be final and to be embodied in the contract. James A. Cable was selected by the local Amalgamated Association men and John M. Kinkel by the company as arbitrators. Both are members of the Public Utilities Commission of Kansas. They requested Frank A. Wightman of the Public Service Commission of Missouri to act with them, the conditions of the previous agreement that the board must be constituted of members of these two state commissions being thereby complied with. The board heard testimony on Dec. 3 at Pittsburg. One paragraph says:

"The board of arbitration unanimously finds that sufficient facts were not presented to justify or warrant at this time a change in the wage scale, except that the so-called 'merit system' or 'sliding scale' seems desirable, and should wherever possible be instituted, for the reason that it has a tendency to promote efficiency of service on the part of the employees."

The finding follows:

"It is the unanimous judgment of this board of arbitration that the wage scale now in force and effect on the Joplin & Pittsburg Railway be continued with the further provision that motormen and conductors (commonly known as 'platform men') should, after five years of continuous service, be paid at the rate of 27 cents an hour."

Before the strike the company offered the men 26 cents an hour for the first year and 27 cents thereafter. The men at first demanded 40 cents, but reduced the demand to 33⅓ cents. Since the resumption of traffic, the rate paid has been 25 cents an hour, with the provision that a platform man after one year of service is to receive 26 cents. The award adds 1 cent an hour after five years' service. Thus the award is considerably under the offer made by the company before the strike, the offered figure of 27 cents after the first year, made by the company, not being reached under the arbitration decision until after five years, and the offered figure of 26 cents an hour made by the company for the first year coming under the award with the second year.

The other sections of the wage schedule, which remains unchanged, are as follows: Blacksmiths, 33 cents an hour; machinists, 35 cents; carpenters, first class, 33 cents; carpenters, second class, 28 cents; painters, 33 cents; painter's helpers, 20 cents; pitmen, 27 cents; pitmen's helpers, 20 cents; armature winders, 35 cents; car cleaners, 20 cents; head-light, tail-light and telephone men, 25 cents.

MASSACHUSETTS STREET RAILWAY ASSOCIATION

Account of December Meeting and of Presentation to Secretary Clark

At the regular monthly meeting of the Massachusetts Street Railway Association at Boston on Dec. 16 P. F. Sullivan, president of the Bay State Street Railway, said that in his opinion the recent Middlesex & Boston rate decision marked a turning point in electric railway history and opened the way toward better days for the industry. The pronouncement of the board allowing 20 per cent of gross income as a tentative figure covering maintenance and depreciation was of great interest. If such an allowance had been made by the Massachusetts street railways last year there would have been required $600,000 in excess of the amount paid out in maintenance alone. The companies actually paid 17.5 per cent, although 25 per cent is the actual requirement in many cases. Great difference existed among companies, and to reproduce the property in twenty years would require in one case a 15 per cent and in another a 40 per cent maintenance and depreciation allowance. The importance of studying each case upon its merits was emphasized by Mr. Sullivan in closing his formal remarks, after which he turned unexpectedly to Secretary Charles S. Clark and on behalf of the association presented him with a handsome gold watch appropriately encased in a Christmas stocking as a mark of appreciation. Before the secretary could respond a second gift was brought forth in the form of a hand-illustrated book depicting in verse and sketches various episodes in the career of the astonished guest of honor, and one after the other past-presidents, E. C. Foster, John R. Graham, Francis H. Dewey, E. P. Shaw and Robert S. Goff, spoke of the able and loyal service rendered by Secretary Clark. On behalf of Stone & Webster, Edward F. Flynn, Boston, offered congratulations and good wishes, and after the guest of honor made a characteristic response the meeting adjourned.

CLEVELAND NEAR-SIDE ORDINANCE DEFEATED

The Meyers ordinance, requiring cars to stop on the near side of the street, was defeated in the City Council at Cleveland, Ohio, on Dec. 14. At the same meeting Councilman Dittman submitted an ordinance providing that all cars leaving the Public Square shall be operated as pay-as-you-leave cars and all cars going toward the Square shall be operated as pay-as-you-enter cars. This will make the system uniform on all lines reaching the Square. Heretofore changes have been made frequently and much confusion resulted.

The Warner Road extension of the Cleveland Railway tracks from the intersection of Miles Avenue and Broadway to Bancroft Avenue was put in operation on Dec. 15. The through 105th Street cars will now use this track instead of making a loop that has not been satisfactory in the past. The Harvard-Denison line, which terminated at Broadway, will soon be completed on Harvard Avenue to East Ninety-third Street.

Legislation is pending in Council providing for the purchase of the North Randall line by the Cleveland Railway. This is the line that reaches the race tracks.

It is possible that plans for building tracks on Euclid Avenue between East Twenty-second and East Fortieth Streets, known as "Millionaires' Row," may meet with opposition from members of Council who feel that this additional expense should not be incurred just now. Because of the opposition of wealthy residents along that section of the street the company was never able to secure the right-of-way for tracks and was forced to run on Prospect Avenue for that distance, but the shift in the residence section has made it possible, both company and city officials believe, to secure consents of property owners at this time.

Judge Leighley of the Common Pleas Court has set aside the verdict of the jury which recently found George De Graff guilty of obtaining $500 from the Cleveland Railway on false pretenses and allowed the man to plead guilty to a minor offense. The cases against Dr. C. D. Treister and Dr. Sidney J. Havre, who were indicted with him, have been dismissed.

SUBWAY ORDINANCE PASSED IN CLEVELAND

The City Council of Cleveland, Ohio, passed the amended ordinance of the Cleveland Rapid Transit Railway on Dec. 14. W. R. Hopkins, president of the company, stated that the Ohio Public Utilities Commission will be asked to authorize an issue of bonds to the amount of $12,000,000 or $15,000,000, from the proceeds of which the first two lines of the proposed subway system will be built. The amended ordinance gives the company twelve months within which to begin the construction work and the first line must be completed within thirty months. It allows the use of larger tubes than were contemplated originally and increases from $350.000 to $550,000 per mile of single track the fixed amount the city shall pay in case municipal ownership of the line is decided upon.

LOS ANGELES FRANCHISES

Eleven Grants Expire in Los Angeles at Different Periods in Next Four Years

The Board of Public Utilities of Los Angeles has recently made an investigation of the franchises held by the local street railway companies and reports that between the present time and Jan. 1, 1919, eleven street railway franchises, covering approximately 9.45 miles of track within the city limits, will expire. The franchises held by the Los Angeles Railway Corporation and their dates of expiration are as follows: Temple Street, from Spring to Hoover, 2.94 miles, July 7, 1915; Maple Avenue, from Seventh to Thirty-second, 1.95 miles, Jan. 28, 1916; Pico Street, from Flower to Hoover, 1 mile, Jan. 28, 1916; Ninth Street, from Lake to Grandview, 7 miles, Nov. 27, 1916; Macy Street, from Mission to Brooklyn, 0.17 mile, April 14, 1917; Fifth Street, from Maple to San Pedro, 0.17 mile, Aug. 27, 1917; Mateo Street, from Palmetto to Eighth, 0.73 mile, Sept. 29, 1918; Santa Fé Avenue, from Ninth to south charter boundary, 0.72 mile, Sept. 29, 1918. Total, 7.75 miles.

The expiring franchises of the Pacific Electric Railway are Sunset Boulevard, from Echo Park to Maltman, 1.59 miles, Dec. 1, 1916; Echo Park Avenue, from Sunset to 600 ft. north of Sunset, 0.11 mile, April 15, 1917; Pasadena Short Line crossing at Macy, Echandia and Lord Streets, Dec. 13, 1918, making a total of 1.70 miles.

The fact that the Temple Street franchise of the Los Angeles Railway Company, from Spring Street to Hoover Street, will expire almost within six months, has given rise to the suggestion that if the city plans to take this line over for municipal ownership the Council should at once define its position in the matter.

"S. O. S." MUNICIPAL OWNERSHIP SIGNAL

After relating briefly the experiences of the Canadian cities of Edmonton and Calgary with municipally-owned electric railways the Seattle *Times* said in an editorial in its issue of Dec. 9:

"By contrast Seattle is in splendid condition, although while Seattle's population has grown fourfold, its debts, on account of municipal ownership and other follies, have increased twelvefold.

"If the municipal ownership theorists in the City Council could have had their way and plunged this city clear in 'to the neck' as is the case at Edmonton, the situation here would be indescribably bad.

"Seattle's bonded debt to-day is $15,420,000; but if the Edmonton per capita rate prevailed here, the total now would be the stupendous figure of $98,784,000—or nearly six times the present total. If Seattle carried Edmonton's per capita municipal railway debt, the obligation on that count alone would be $12,222,000.

"The Canadian towns have sunk into the depths of despair by reason of their ruinous experience.

"Seattle is waking up just in time to save the taxpayers from similar disaster.

"It is proper, therefore, to 'shake down' the municipally-owned car lines, to ferret out the false and fictitious 'dividends' proclaimed regularly by the city lighting plant, and to take warning generally that the fad for control and operation of public utilities is a thing that can be pushed too far.

"In a word, Seattle can catch this fallacy in time to spare the necessity of the 'S. O. S.' for the municipal 'ship of state.'"

SAFETY EXPOSITION IN NEW YORK

The second exposition of safety and sanitation was held at the Grand Central Palace, New York, during the week ended Dec. 19, under the auspices of the American Museum of Safety. The New York Central Railroad occupied a large amount of space with a model of the Empire State Express running at top speed and with slides of its road equipment, methods of operation, and charts showing what that road has accomplished by its campaign of safety in preventing accidents. The Southern Pacific Company and the Union Pacific Railroad had exhibits displaying sections of actual roadbed and block signal equipment operated automatically by electricity. Figures were displayed to show how accidents have been all but eliminated. Accident prevention was the keynote of the exhibit of the Brooklyn Rapid Transit Company, which showed stereopticon and other pictures. Models of the new side-door type of subway cars and stepless cars were shown. Alongside of this exhibit was one by the Brooklyn Institute for Safety. A jury of awards will select the best and most important new devices shown by each industry and will award prizes.

ANNUAL REPORT OF CONNECTICUT COMMISSION

The third annual report of the Public Utilities Commission of Connecticut was submitted to the Governor on Dec. 16. The commission declares that the continued frank and friendly cooperation of all public service companies and the prompt acceptance of suggestions made by the commission, as well as the compliance with orders for the betterment of service or safety of operation, is resulting in an increased efficiency that is highly gratifying to the commission. Attention is again called to the recommendations made in the report for 1912 that there should be enacted "a law which

will effectively prohibit the merger or consolidation of public service companies without first obtaining the approval of the public utilities commission."

There are 190 public service companies under the jurisdiction of the commission, twenty-nine electric, two express, thirteen gas, seventeen gas and electric, eight railroad, twenty-two electric railway, three telegraph, ten telephone and eighty-six water companies. Forty-eight petitions of approval of proposed construction or reconstruction of tracks by electric railways have been approved in whole or in part. One hundred and fourteen informal complaints were received, all of which were investigated, and in most cases the conditions complained of were corrected. The details of the report in so far as they relate to the electric railways will be published in the ELECTRIC RAILWAY JOURNAL of Dec. 26.

Annual Report of Transit Commissioner of Philadelphia.—The annual report of A. Merritt Taylor, director of the department of city transit of Philadelphia, Pa., for the current year has just been published. It gives a brief sketch of the organization of the department and outlines the recommendations of the commissioner as to the proposed rapid transit system, previously described in these columns.

New York's Subway Labor Problem.—Owing to the situation caused by the pending litigation involving the constitutionality of the alien labor clause of the State labor law and the recent decision of Judge Newburger, upholding the law, the Public Service Commission for the First District of New York deferred the opening of bids for the construction of Section No. 4 of Routes Nos. 4 and 36, set for Dec. 11, until Dec. 29. Section No. 4 covers that portion of the Broadway subway lying in Seventh Avenue between Fifty-first and Fifty-ninth Streets. The commission began advertising for bids for its construction about three weeks ago.

The Proposed Cleveland, Canton & Akron Terminal Railway.—In order to work out plans for the freight subway under East Fifty-fifth Street, Cleveland, as proposed by O. C. Barber, the Cleveland, Canton & Akron Terminal Railway has been incorporated with a capital stock of $10,000 by W. W. White, Thomas H. Garry, James McSweeney, W. M. Connelly and W. B. Snavely. The present capital is only nominal. The company will first endeavor to secure a franchise, after which the Public Utilities Commission will be asked to allow the issue of securities to construct the road and large coal and ore docks on the lake front.

Chicago Elevated Organizes Club.—About one hundred of the officers and supervisory force of the Chicago (Ill.) Elevated Railways have formed an organization to be known as the Elevated Club. The following officers have been elected: President, H. A. Johnson, master mechanic; vice-president, T. D. Milne, trainmaster; secretary and treasurer, E. L. Smith, power supervisor. The club will hold regular meetings once each month. At these meetings addresses will be made by one of its members or by outside speakers. Following the organization of the club, Peter Junkersfeld, assistant to the vice-president of the Commonwealth Edison Company, Chicago, delivered an illustrated address on power development in and about Chicago.

Subway Suggestion in St. Louis.—Richard McCulloch, vice-president and general manager of the United Railways, St. Louis, Mo., commenting on the initial plans for a subway, considered by the Kiel administration, was quoted recently as follows: "A subway for St. Louis is a big project. A municipal corporation or a private corporation cannot afford to put money into a subway unless it believes from the reports of competent engineers that the probable earnings and service will justify the cost. The United Railways has not employed engineers so far to investigate the feasibility of a subway from this standpoint. City officials have not consulted us on the subject, but we are ready and willing to give city officials any information or assistance we can whenever they decide to take up the question."

Prospects for Increased Power for the I. C. C.—Senator Newlands, of the interstate commerce committee of the Senate, said after a visit to the White House, on Dec. 11, that the Rayburn bill, regulating stock and bond issues of railroads engaged in interstate commerce, had not been abandoned. Senator Newlands said the President was inclined to believe that the Interstate Commerce Commission is overburdened with work at the present time, and that it would be better to let the stock and bonds issue bill go over until next session when a comprehensive measure, increasing the size of the commission and perfecting the machinery of that body so as to handle the additional work, could be presented. Such a bill would probably provide for dividing the work of the commission so as to be handled by three sections, one taking railroad rates, another physical valuation of railroads and the third the issue of securities.

Seattle Reconstruction Costs.—The first of the reports from the heads of city departments regarding the cost of reconstruction of the Seattle, Renton & Southern Railway as a city line have been made to Mayor H. C. Gill of Seattle, Wash. According to M. H. Tiedeman, assistant city engineer, it will cost between $363,000 and $762,000, depending upon the character of the work, to reconstruct the roadbed, install a double track from Dearborn Street to Fifty-seventh Avenue South and put in the necessary street improvements. This estimate does not include the cost of cars. J. D. Ross, superintendent of lighting of the city, estimates that it will cost an additional $150,000 to provide equipment necessary to furnish power to the line from the city plant. New substations will be necessary in Columbia City and an addition will have to be built to the central distributing plant in Seattle. The sale of the property to the city is now pending.

Chicago Merger and Subway Proposals.—Several propositions before the local transportation committee of the Chicago City Council upon which hinge the character of a proposed passenger subway are again up for disposition. These include consolidating the surface and the elevated lines with a subway in the downtown district to furnish both lines additional track capacity. Negotiations with this in mind were taken up in 1912, but failed because of a $30,000,000 difference in the real estate values as estimated by the railway company and by the city's harbor and subway commission. Recently a sub-committee of the local transportation committee has been appointed to give further consideration to this difference in real estate values. The work of this committee consisted of bringing the real estate values up to date and making such revisions as it deems necessary. The committee, assisted by Montague Ferry, commissioner of public service, reported its findings to the local transportation committee on Dec. 17, 1914.

Kentucky Compensation Law Unconstitutional.—The Court of Appeals of Kentucky, in a majority opinion handed down on Dec. 11, held unconstitutional the workmen's compensation act passed by the last Legislature. The decision turned on the contention that while employees might voluntarily waive their rights to recover damages under the constitution, the provisions of the law were such that they would automatically be drawn into such contract and that thus the law was such that "the compensation of the injured man is limited to the amount specified in the schedule of the act." The majority of the court expressed the opinion that the Legislature could pass an enforcible act, but the dissenting opinion, signed by three judges, held that the decision was such as to make it impossible for the Legislature to enact an effective compensation law under the present constitution. The law was to have become effective as to its compensatory provisions on Jan. 1, 1915.

Proposed Auto-Bus Routes in New York.—Harry P. Nichols, head of the franchise bureau of the Board of Estimate and Apportionment of New York, N. Y., has worked out a plan of routes in connection with the applications for auto-bus rights before the city and a public hearing was set for Dec. 18 in the City Hall. Applications for franchises have been made by the present Fifth Avenue Coach Company, the New York Motor Bus Company, the Manhattan Motor Bus Company, and the People's Five-Cent Bus Corporation. The Nichols plan has not followed the suggestions made by any one of these concerns, but rather has been worked out to provide a system of routes which would be particularly useful in this city, taking into account the existing lines of the Fifth Avenue Coach Company and providing for operation to fill in the gaps left by the subway, elevated and surface railway systems already in operation. According to Mr. Nichols' plan none

of the motor buses would run south of Fourteenth Street. From that thoroughfare two trunk lines are planned, one to serve the east side and one the west side of the city.

New Haven Conspiracy Cases Argued.—Argument was heard on Dec. 11 before Judge Grubb in the Criminal Branch of the United States District Court at New York in the conspiracy case in which twenty-one directors of the New York, New Haven & Hartford Railroad were indicted. The cases of John L. Billard, James S. Elton and William Skinner came up, they having put in pleas in bar. Counsel for Mr. Billard, in the first place, however, moved to withdraw that plea, and to have a plea in abatement entered instead, the effect of which would be, if successful, to bring the proceeding to an end, because of mistakes made by the government. Judge Grubb denied the motion. Counsel for the other defendants maintained that they were immune from prosecution because of their testimony before the Interstate Commerce Commission. Counsel for the government argued that the purpose of the law, which provides that testimony given by a defendant cannot be used against him, applies only to that particular proceeding; or, at any rate, only to a proceeding in which no case could be made out without the testimony of such defendant, which, it was claimed, would not apply in the present instance.

Valuation of St. Louis Properties Suggested.—The Civic League of St. Louis, Mo., has suggested to the Missouri Public Service Commission that a physical valuation of the property of the United Railways be made to afford a basis upon which to settle the question of downtown loops and service improvements. A letter to the commission from the league says in part: "Your engineer has accepted a certain arbitrary standard as adequate service, namely, an average of all seats filled and a certain number standing. The quality and price of service from a public utility should depend, we believe, not upon any arbitrary standard, but upon the public's getting everything over and above a reasonable return on the company's investment or fair value of the property devoted to the service of the public. Granting that there should be a return on the capital such as will form a proper reward for its use, all above that amount earned by the company should be put either into improved service or into a reduction in fares. This, of course, at once raises the question of valuation, and no satisfactory solution can be had without a valuation. The valuation of the United Railways should not be a difficult matter. In fact, through our local public service commission a valuation of physical property has been made which was agreed to by the company within 6 per cent. We submit that it would be easy to verify that valuation and determine what amount has been put into the property since. With the physical valuation determined, the question of intangible values only remains."

PROGRAMS OF ASSOCIATION MEETINGS

Wisconsin Electrical Association

The annual meeting of the Wisconsin Electrical Association will be held at Milwaukee, Wis., on Jan. 20, 21 and 22. The session on Jan. 20 will be devoted to gas subjects, that on Jan. 21 to joint subjects and that on Jan. 22 to subjects pertaining to electric railways and electric utilities. The banquet will be held at the Hotel Pfister, Milwaukee, on the evening of Jan. 21.

International Engineering Congress, 1915

Some confusion seems to have arisen regarding the international electrical congress, which is was proposed to hold in San Francisco in September, 1915, and the International Engineering Congress, which is to be held during the same month. Owing to the situation abroad, and the impossibility of convening the International Electrotechnical Commission, under whose authorization the electrical congress was to have been held, it has been decided by the governing body of the American Institute of Electrical Engineers to postpone the holding of the electrical congress indefinitely. This does not affect the International Engineering Congress, in connection with which marked progress is being made. Full information concerning the congress may be obtained by inquiry at the headquarters of the congress, Foxcroft Building, San Francisco, Cal.

Financial and Corporate

RESUMPTION OF STOCK TRADING

The chief item of interest during the past week has been the results of the opening of the New York Stock Exchange on Dec. 12. The opening was hedged with caution, but there were no evidences of an avalanche of foreign liquidation. Rather does there exist, as a result of long economy, a substantial and confident investment demand. The advance of Brooklyn Rapid Transit stock on the opening day one-quarter over the last committee sale and 7¼ over the July 30 price indicates the general behavior of price quotations.

On the curb American Light & Traction is selling above the closing price of July 30, and the elimination of weak accounts during the last three months is expected to create a steady increase. The common and preferred stocks of the Cities Service Company advanced sharply on rumors of dividend resumption, but the common has fallen back to around 50. The resumption of dividends seems to be dependent upon a market for absorbing new securities. The company reports a small increase in gross operating revenue for November, but a decrease in net income and surplus as compared to the same month of last year. Virginia Railway & Power Company reports slightly decreased gross but improved net earnings.

Some hesitancy among the investors in taking up railroad and industrial issues is still apparent, the railroad issues in particular being passed by the more conservative buyers. That this condition will remain until the railroads get some relief from their present financial troubles is the opinion of the majority of the bond dealers. Investment bankers, however, expect that after the first of the year there will be a general resumption of business to normal.

CORPORATION TAXES

The report of the commissioner of internal revenue shows that 316,909 corporations made reports under the income tax law for 1913. These represented a total capitalization of $101,207,534,281, divided into capital stock of $34,071,319,185 and bonded and other indebtedness of $37,136,215,096, an increase of $2,333,091,459 over 1912 in capital stock and $2,386,698,743 in indebtedness. Their total income was $4,339,550,008, an increase of $507,399,597 over 1912. Of the 316,909 corporations reporting 128,043 made declarations that they had earned no net income in the year.

In Class "B," public service corporations, such as railroads, steamboat, ferryboat and stage line companies; pipe line, gas and electric light companies; transportation and storage companies; telegraph and telephone companies, 26,358 companies made reports, showing capital stock of $22,120,255,489 and bonded and other indebtedness of $20,198,907,819, on which net income was $1,003,185,721, although 11,928 companies reported no income. The percentage earned on capital stock was 4.55 per cent, and the percentage of indebtedness to capital stock was 91.31 per cent.

Returns filed during the year increased 3.79 per cent over previous year, while increase of taxable returns was 209.02 per cent, due almost entirely to removal of the $5,000 specific exemption. For years 1909 to 1912, inclusive, there was collected as special excise tax on corporations $118,060,868. During the fiscal year 1914 there was collected as special excise tax $10,671,077, or a grand total of $128,731,945 special excise tax collected for 1909 to 1912, inclusive, as well as for January and February, 1913. Special excise and income tax collected during the fiscal year ended June 30, 1914, was $43,127,739, against an aggregate assessment during that period of $45,614,369.

The following table shows the details of the various classes, Class "A" representing financial and commercial corporations; Class "C" industrial and manufacturing plants; Class "D" mercantile dealers, and Class "E" architects, contractors, theaters and all others.

	Net income
Class A	$438,746,584
Class B	1,003,185,721
Class C	2,026,883,951
Class D	473,201,741
Class E	397,532,000
Total	$4,339,550,008

ANNUAL REPORT

Aurora, Elgin & Chicago Railroad

The statement of income, profit and loss of the Aurora, Elgin & Chicago Railroad, Wheaton, Ill., for the year ended June 30, 1914, follows:

Gross earnings and other income:	
Revenue from transportation	$1,726,724
Revenue from operations other than transportation	368,259
Interest	870
Miscellaneous	330
Total	$2,096,183
Operating expenses and taxes:	
Maintenance of way and structures	$202,806
Maintenance of equipment	158,190
Traffic	9,004
Conducting transportation	655,454
Other operations	33,966
General and miscellaneous	307,522
Total	$1,366,942
Less undistributed operating credits	24,091
Remainder	$1,342,851
Taxes	53,940
Total operating expenses and taxes	$1,396,791
Gross income	$699,392
Deductions from income	418,759
Net income	$280,633
Profit and loss surplus at beginning of year	557,394
Profit and loss—gross surplus	$838,027
Profit and loss charges:	
Dividends	$279,000
Other	1,308
Total	$280,308
Profit and loss—surplus at end of year	$557,719

The revenue from transportation during the year was $1,726,724, as compared to $1,674,768 for the year ended June 30, 1913, an increase of $51,956, or 3.1 per cent. The total gross earnings increased $81,340, or 4.03 per cent. The total operating expenses and taxes increased from $1,238,642 to $1,396,791, an amount of $148,149, or 11.9 per cent. This increase was largely made up by the following increases in the several operating groups: Maintenance of way and structures, $48,417, or 31.3 per cent; maintenance of equipment, $29,918, or 23.3 per cent; conducting transportation, $55,061, or 9.1 per cent; general and miscellaneous, $15,585, or 5.3 per cent, and taxes, $9,973, or 22.7 per cent. Expenses for other operations decreased approximately 3 per cent, and traffic expenses showed a slight decrease.

Gross income for the period decreased $76,809, or 9.7 per cent, while the net income on account of increased deductions decreased $100,345, or 26.3 per cent. Owing to the fact, however, that the profit and loss surplus at the beginning of the previous year was nearly $100,000 larger than at the beginning of the present year, the surplus at the end of the present year has been slightly more than fully maintained up to the June 30, 1913, standard.

The report mentions the various unusual items of maintenance during the year, and states that the lines and property of the company are in excellent condition. Ten new cars were put in service during the year. Owing to the dissolution of the United States Express Company, the revenue from this source was lost, but the company is undertaking through the Arrow Transfer Company to build up a local freight and express business between Chicago and various towns along the line. The company now has in its treasury $1,119,000 of first and refunding bonds certified against construction heretofore made, which will be sold to liquidate present notes and accounts payable and leave a substantial cash balance when market conditions again become normal.

Bartlesville (Okla.) Interurban Railway.—Henry L. Doherty & Company and Frederick J. Curnick, New York, N. Y., are offering for subscription, at 95 and interest, the final block of $32,500 of a total of $250,000 of first mortgage 6 per cent gold bonds of the Bartlesville Interurban Railway, dated 1910 and due July 1, 1934, but redeemable on any interest date at 102 and interest. The mortgage under which the bonds are secured is now closed. The interest on the bonds is payable January and July at the office of the Equitable Trust Company, New York, N. Y. The bonds are in the denomination of $500. The Citizen's Bank & Trust Company, Bartlesville, is trustee in the mortgage.

Birmingham, Ensley & Bessemer Railroad, Birmingham, Ala.—The independent committee of bondholders of the Birmingham, Ensley & Bessemer Railroad has decided to hold open its deposits for the present and invites the holders of the first mortgage 5 per cent bonds to deposit their securities with the American Trust Company, Boston, Mass., depository, or with the Columbia Trust Company, New York, N. Y., as agent. The committee says that the financial and physical investigation conducted in its interest makes it possible for the committee to intervene in any foreclosure suit and to guarantee its bondholders against any prejudice to their interest which may arise from a private sale.

Cities Service Company, New York, N. Y.—Henry L. Doherty, president of the Cities Service Company, has concluded a circular to the stockholders of the company as follows: "We are still of the opinion that when the present disturbance is at an end and conditions have become normal, public utility securities will be held in relatively higher esteem than ever before, and especially those representing a wide diversity, such as is found in the Cities Service Company. No immediate change is contemplated in policy of deferring dividends, although the matter is under constant consideration."

Fairmount Park Transportation Company, Philadelphia, Pa.—C. J. Jones has been elected a director of the Fairmount Park Transportation Company to succeed Robert Wetherill, Chester, Pa., resigned.

Interborough-Metropolitan Company, New York, N. Y.—The application of the Interborough-Metropolitan Company to the Stock Exchange is to list $28,784,100 of 5 per cent cumulative preferred stock instead of $17,942,000 as announced in the ELECTRIC RAILWAY JOURNAL of Dec. 12, page 1316. This is not in any manner an increase of capital stock, but simply a reconversion of preferred stock voting trust certificates into preferred stock. To date $17,942,000 of the voting trust certificates have been reconverted into preferred stock, leaving $10,842,000 still to be reconverted from time to time. Of the $45,740,000 total preferred stock of Interborough-Metropolitan Company only $28,784,100 was originally placed in the voting trust. The difference of $16,955,900, in stock, was listed long ago. The common stock is all in voting trust certificates, which are listed, but the stock itself is not.

International Traction Company, Buffalo, N. Y.—Ten second mortgage sinking fund gold bonds of the Buffalo & Niagara Falls Electric Railway, dated July 1, 1896, have been called for payment on Jan. 1, 1915, at 105 and interest at the office of the Bankers' Trust Company, New York, N. Y.

Jacksonville Railway & Light Company, Jacksonville, Ill.—The Jacksonville Railway & Light Company has called for payment at 103 and interest on Jan. 1, 1915, at the office of the Merchants' Loan & Trust Company, Chicago, Ill., two first mortgage bonds of $1,000 each and six of $500 each issued by the Jacksonville Gas, Light & Coke Company.

Memphis (Tenn.) Street Railway.—The Memphis Street Railway has declared a dividend of 2½ per cent on the $2,500,000 of common stock, payable on Dec. 31 to holders of record of Dec. 22. The American Cities Company owns 86 per cent of the common stock of the Memphis Street Railway and 88 per cent of the preferred stock. On June 30, 1914, one-half of 1 per cent was paid and in December and March, 1913, and June, 1912, 1 per cent each. The payment in June, 1912, was the first made.

National Properties Company, New York, N. Y.—The National Properties Company, through its ownership of the Wilmington & Philadelphia Traction Company and the Wilmington Light & Power Company, has secured control of the E. I. duPont de Nemours Powder Company's electric transmission lines, distributing system and light and power business, extending through the Valley of the Brandywine from Wilmington to Winterthur.

New Orleans Railway & Light Company, New Orleans, La.—The New Orleans Railway & Light Company has declared a dividend of 1 per cent on the $20,000,000 of common stock of the company, payable on Dec. 31 to holders of record of Dec. 19. In June, April and January, 1914,

one-half of 1 per cent was paid on the stock, while 1 per cent was paid in June and one-half of 1 per cent in January, 1913. An initial payment of 1 per cent was made on July 1, 1912.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—The Railroad Commission of California has authorized the Oakland, Antioch & Eastern Railway to issue promissory notes of the total face value of $295,345. It is made a condition of the commission's order that these notes shall bear interest at not to exceed 7 per cent per annum. A group of bondholders of the company called a general meeting of bondholders in San Francisco on Dec. 11 and elected W. M. Alexander temporary chairman, giving him power to appoint a committee of four to consider the financial report of the expert accountants which is now in course of preparation, and advise the security holders of their views concerning the new financing.

Portsmouth Street Railroad & Light Company, Portsmouth, Ohio.—The unsold portion of a total authorized issue of $500,000 of new first mortgage 6 per cent bonds of the Portsmouth Street Railroad & Light Company is being offered for a subscription at par and interest by John Nickerson, Jr., New York, N. Y., and St. Louis, Mo. The bonds are dated July 1, 1914, and are due serially, $25,000 each July 1, from 1918 to 1934, both inclusive, and $75,000 on July 1, 1935. They are in the denomination of $1,000 and $500 and are callable at 102½ on any interest date. Interest is payable in January and July at the office of the Guaranty Trust Company, New York, N. Y., trustee. The bonds are being issued to provide funds to extend the railway lines of the company from Portsmouth, Ohio, to Ironton, Ohio, 22 miles, build a new carhouse, make other improvements and reimburse the treasury for the redemption of the $50,000 of first mortgage 5 per cent bonds of 1906 called for payment on Jan. 1, 1915, at 102. The extension to the railway lines will be built by the Ohio Valley Traction Company, a subsidiary, all of the securities of which will be pledged as part security for the new bond issue. The line between Portsmouth and Ironton will be operated by the Portsmouth Street Railroad & Light Company under the lease from the Ohio Valley Traction Company, which continues for twenty years after the maturity of the bonds.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—The San Francisco-Oakland Terminal Railways has asked the Railroad Commission for an extension of time to June 30, 1915, in which to dispose of $239,370 of promissory notes. These notes are part of an issue amounting to $650,000, which was ratified by the commission on June 23, 1914. Up to Oct. 1, 1914, when the authority granted by the commission expired, the company had succeeded in disposing of only $420,630 of the notes. In addition to an extension of time on the $239,370 of notes remaining unsold, the company desires authority for a further issue of notes secured by the pledge of $370,000 of its general lien mortgage bonds, upon the condition that the face value of the notes issued shall at no time be greater than 66 2/3 per cent of the face value of the bonds pledged as collateral. From the proceeds of the sale of these new notes the company proposes to reimburse itself for $148,922 expended from income for capital purposes; purchase new cars to the value of $75,000; and expend $22,744 for the construction of an interlocking plant at Stanford Avenue and Lowell Street, Oakland. Between Jan. 1 and Jan. 15, 1915, the company states that it will be required to meet interest payments on its bonded indebtedness amounting to $372,830.

Shore Line Electric Railway, Norwich, Conn.—The board of directors of the Shore Line Electric Railway has been reduced from fifteen to nine. The following directors have been elected: C. W. Sheafe, Jr., W. S. Rathbun, W. L. Barnett, F. E. Hall, A. E. Clark, A. S. May, W. C. Skidmore, E. G. Buckland and J. M. Tomlinson.

St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo.—E. W. Clark & Company, Philadelphia, Pa., with whom there was deposited substantially all of the $3,500,000 of common stock of St. Joseph Railway, Light, Heat & Power Company, sold to Henry L. Doherty & Company, New York, N. Y., for the Cities Service Company at $60 a share, notified depositing stockholders that the balance of $35 a share on the stock would be paid, with accrued interest, on and after Dec. 10. Funds for the payment of this stock were secured by the sale of $1,118,000 of St. Joseph Railway, Light, Heat & Power Company trust certificates secured by all the deposited common stock of the St. Joseph company. Trust certificates will be retired monthly through a sinking fund provided by the Cities Service Company, the final certificate being retired June 1, 1917.

DIVIDENDS DECLARED

American Cities Company, New Orleans, La., 3 per cent preferred.

Boston & Worcester Electric Companies, Boston, Mass., $1 preferred.

Duluth-Superior Traction Company, Duluth, Minn., quarterly, 1 per cent, preferred; quarterly, 1 per cent, common.

Elmira Water, Light & Railroad Company, Elmira, N. Y., 1¾ per cent, first preferred.

Illinois Traction System, Peoria, Ill., quarterly, 1½ per cent, preferred.

Memphis (Tenn.) Street Railway, quarterly, 1¼ per cent. preferred; 2½ per cent, common.

New Orleans Railway & Light Company, New Orleans, La., quarterly, 1¼ per cent, preferred; 1 per cent, common.

Twin City Rapid Transit Company, Minneapolis, Minn., quarterly, 1¾ per cent, preferred; quarterly, 1½ per cent, common.

Washington, Baltimore & Annapolis Electric Railway, Washington, D. C., quarterly, 1½ per cent, preferred.

West Philadelphia (Pa.) Passenger Railway, $5.

ELECTRIC RAILWAY MONTHLY EARNINGS

COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., Oct.,	'14	$1,238,485	*$694,238	$544,247	$354,160	$190,087
1 " "	'13	1,228,540	*717,582	510,958	327,301	183,657
12 " "	'14	14,755,029	*8,366,386	6,388,643	4,149,615	2,239,028
12 " "	'13	13,969,348	*8,094,798	5,874,550	3,788,479	2,086,071

CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, MAINE.

1m., Oct.,	'14	$214,808	*$124,150	$90,658	$62,050	$28,608
1 " "	'13	204,249	*115,886	88,363	63,735	24,628
12 " "	'14	2,514,508	*1,437,982	1,076,526	761,103	315,423
12 " "	'13	2,306,150	*1,286,259	1,019,891	700,142	319,749

EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

1m., Oct.,	'14	$216,801	*$130,395	$86,406	$62,175	$24,231
1 " "	'13	240,841	*148,447	92,394	49,547	42,847
12 " "	'14	2,686,595	*1,673,694	1,012,901	668,393	344,508
12 " "	'13	2,668,715	*1,545,041	1,123,674	589,109	534,565

GRAND RAPIDS (MICH.) RAILWAY.

1m., Oct.,	'14	$102,963	*$70,443	$32,520	$13,990	$18,530
1 " "	'13	104,968	*69,108	35,860	13,306	22,554
12 " "	'14	1,286,295	*834,409	451,886	160,123	291,763
12 " "	'13	1,286,369	*790,821	495,548	171,038	324,510

HUDSON & MANHATTAN RAILROAD, NEW YORK, N. Y.

1m., Oct.,	'14	$468,023	$191,179	$276,844	$211,132	$65,712
1 " "	'13	473,988	198,899	275,088	207,341	67,747
4 " "	'14	1,767,346	742,844	1,024,502	848,556	175,945
4 " "	'13	1,768,527	767,431	1,001,094	823,816	177,278

INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK, N. Y.

1m., Oct.,	'14	$2,982,156	$1,070,342	$1,911,814	$1,081,205	$830,609
1 " "	'13	2,955,977	1,079,517	1,876,460	1,227,996	648,464
4 " "	'14	10,616,495	4,126,622	6,489,873	4,327,325	2,162,538
4 " "	'13	10,371,063	4,134,218	6,236,845	4,550,761	1,686,084

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, MAINE.

1m., Oct.,	'14	$57,309	*$37,506	$19,803	$15,569	$4,234
1 " "	'13	51,301	*36,068	15,233	14,456	777
12 " "	'14	679,626	*463,852	215,774	185,789	29,985
12 " "	'13	668,543	*419,260	249,283	177,699	71,584

NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.

1m., Oct.,	14	$27,185	*$25,085	$2,100	$7,876	†$5,776
1 " "	'13	26,982	*29,635	2,654	7,850	†10,504
4 " "	'14	166,581	*115,642	50,949	31,503	19,446
4 " "	'13	161,169	*114,909	46,260	30,741	15,519

NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.

1m., Oct.,	'14	$39,075	*$42,944	$3,799	$5,874	†$9,675
1 " "	'13	35,297	*45,320	10,024	5,123	†15,147
4 " "	'14	149,820	*171,132	21,312	23,695	†45,007
4 " "	'13	139,194	*193,965	54,771	20,998	†75,769

*Includes taxes.
†Deficit.

Traffic and Transportation

THE CLAY COUNTY RATE DECISION

Rehearing Will Be Asked in Case of Order for Commutation Fares Applying Only to Short Distances on Two Divisions

As announced briefly in the ELECTRIC RAILWAY JOURNAL of Dec. 12, page 1319, the Public Service Commission of Missouri on Dec. 7 issued an order to the Kansas City, Clay County & St. Joseph Railroad to begin on Jan. 1, 1915, issuing commutation tickets on definite rate schedules established by the commission which figure out at about 1.1 cents a mile. A feature of the order was the commission's valuation of the property of the company.

The Kansas City, Clay County & St. Joseph Railroad was placed in operation on Jan. 21, 1913, charging 2½ cents a mile, or 2¼ cents a mile round trip. Three months later people at Liberty, Mo., and owners of real estate between Liberty and Kansas City began asking for commutation tickets. Shortly after this the steam railroad rates were reduced to 2 cents and the commission ruled that the interurban was a railway and should charge only 2 cents.

The commission asked the company to make a valuation of the property. This was a comparatively simple process because all the records of promotion and organization and of the physical property were available. The company's valuation totaled $5,320,000, as follows: cash, $3,800,000; discount on bonds, $450,000; discount on stock, $310,000; going value, $350,000; working capital, $30,000; promotion fee (figured at 10 per cent of the cash), $380,000. The commission took these figures and made its valuation of $3,900,000. Instead of the company's figure of $380,000 for promotion the commission allowed only $16,000 for this item, although the books and evidence showed that the figure given by the company was the amount of actual cash paid to the promoter. The company's valuation was prepared by Sloan, Huddle, Feustel & Freeman, Madison, Wis. The commission allowed for no discount on the securities of the company issued before the existence of the commission, although when the company issued $135,000 of bonds for a signal system it did allow their sale at a discount of 15 per cent. Included in the section devoted to valuation the order mentioned that the company in its first year showed that it had earned 6.2 per cent on the valuation set by the commission, and the statement was made that this was not as much as the commission would allow the company to earn. There was no statement, however, as to what percentage the company would be allowed to make.

The order requiring commutation rates applies only between Kansas City and Liberty, 14.4 miles, on the Excelsior Springs Division; and to a distance of about 10 miles on the St. Joseph division. As stated, a considerable number of complainants from Liberty and between Liberty and Kansas City had asked the rates, but it is said that only one person on the St. Joseph division in the 10-mile limit had joined the request. There is no order as to commutation rates between St. Joseph and any other points or between Excelsior Springs and any other points. There is no provision for lower rates between intermediate points in the limits named in the order, all the reductions applying to traffic into and out of Kansas City. Explicit prices of commutation tickets, fifty-two rides in a book good for thirty days, the books being non-transferable, are made.

As previously stated, the average rate established by the order is about 1.1 cents a mile. The railway pays the company owning the bridge over the Missouri River, by which entrance is gained to Kansas City, 3½ cents per passenger each way. An instance of the operation of the rate is that the commutation rate from Avondale 4.14 miles from Kansas City is 5.7 cents, which leaves 2.2 cents for the electric line, after paying the bridge company, or about half a cent a mile. The contract with the bridge company was cited in the brief of the electric railway, but there was no reference to it in the commission's order. The Kansas City, Clay County & St. Joseph Railroad is the only electric interurban out of Kansas City wholly or chiefly in Missouri. The Missouri commission, however, took cognizance of the commutation rates of other Kansas City interurbans serving Kansas communities, which rates vary from 1 cent to 1¼ cents a mile.

In its conclusions the commission said that people had bought land along the route of the interurban with the desire and purpose of building homes, but the transportation rate was so high into Kansas City that they could not afford to live there.

J. R. Harrigan, general manager of the company, said that several points presented in the brief and testimony during the hearings warrant a request for a rehearing and continued:

"We showed that the cost of handling passengers, not including taxes or interest charges, was 1 cent a mile. Including the taxes and interest charges the cost of handling passengers was shown to be 1.6 cents a mile. We also showed that we are purely a railway and are not interested in any land along our line; that our revenue is entirely from our street railway traffic."

ORDER IN ALBANY SERVICE CASE

Substantially all of the recommendations regarding service in Albany, N. Y., made by Charles R. Barnes, the electric railway inspector of the Public Service Commission of the Second District of New York, are embodied in an order issued to the United Traction Company on Dec. 12 by the commission. The following improvements are immediately enjoined on the company:

Three modern snow plows to replace the 5½-ton plows now in service and the installation of 50-hp motors instead of 30-hp on the present sweepers. These to be installed by Feb. 1.

Non-rush hour headway of five minutes instead of seven minutes on the Belt Line and rush-hour headway of four minutes between 6:30 a. m. and 9 a. m. and three minutes between 5 p. m. and 6:30 p. m. instead of the present five-minute headway.

Seven-minute headway instead of ten-minute headway during non-rush hours on the Delaware Avenue line.

Transfers to and from the Schenectady cars for passengers to and from points within the city limits on the Schenectady line.

Immediate purchase of twelve new modern cars, seating not less than forty, to be used in place of the present 18-ft. cars of the 100 series.

Immediate increase in the power supply.

Immediate purchase of an automobile wrecking truck, properly equipped, manned and located.

Installation before April 1 of a telephone system along the lines with proper switchboards, etc., for emergency use and for dispatching cars.

Equipment of all single truck cars to remain in service with an auxiliary brake system not later than May 1.

The company is further enjoined to submit a definite program of further improvement to the commission, concerning matters largely of local interest in Albany.

The thirteen clauses in the commission's order of Dec. 12, added to the ten clauses of the order issued on Aug. 10 last, carry out all of the recommendations of Mr. Barnes, or provide for their development at as rapid a rate as possible, with the single exception of the elimination of all the open cars. It was found that this step would have been generally unpopular with the patrons of the road. The orders to the company made last August have been carried out or are under way, the commission finds.

The present decision is in the case into which all of the complaints against the company were consolidated last spring. The recommendations of Mr. Barnes were filed with the commission early in the summer, and hearings were held at which the company objected to many of the recommendations. Those to which there was little objection were immediately made effective and the remainder, the subject of the order of Dec. 12, have been a matter of weekly consideration at the executive sessions of the commission, in order that a way might be found to meet the complaints in an order which would be possible for the company to carry into effect. The order just issued is so arranged as to time that it should not, in the opinion of the commission, impose any undue hardship on the company. The company is instructed to report to the commission the progress which it makes toward carrying out the recommendations.

NEW INDIANA FARES

Statement by Union Traction Company Regarding New Fares Effective on Jan. 1, 1915

The new system of fares which the Union Traction Company of Indiana has been authorized to establish by the Indiana Public Utility Commission will go into effect on Jan. 1, 1915. A statement which has been issued by the company in regard to the new fares reads in part as follows:

"The new system of interurban fares which will be put into effect on the Union Traction lines on Jan. 1, 1915, introduces the copper zone, or 1-cent zone, system in place of the nickel zone, or 5-cent zone, system, which has been in use on the interurban lines as well as on the steam lines in Indiana. Under both systems the rate of fare is 2 cents per mile. By the nickel zone system all fares are computed in multiples of 5 cents, the fare being 'that multiple of five nearest reached by multiplying the rate by the distance.' In determining the distance, the law requires that 'fractions of less than ½ mile shall be disregarded, and all other fractions counted as 1 mile.' As a result of calculating fares in this way the actual rate per mile traveled varies greatly. For instance, the fare for a ride of 3.4 miles is 5 cents, or a little less than 1½ cents per mile. The fare for a ride of 3.8 miles is 10 cents, or almost 3 cents a mile. A ride of any distance, no matter how short, beyond the point where the fares change, adds 5 cents to the fare.

"Under the new copper zone system all fares will be calculated at the former rate of 2 cents per mile, but in ½-mile zones at 1 cent instead of 2½-mile zones at 5 cents each. As a result all passengers will pay at the same rate, as nearly as possible, for the distance actually traveled. The addition of ½ mile to a ride will make a difference of only 1 cent in the fare paid, instead of 5 cents, as was frequently the case under the nickel zone system. Taking the cases already stated, a passenger traveling 3.4 miles will pay 7 cents instead of 5 cents, while a passenger traveling 3.8 miles will pay 8 cents instead of 10 cents. Both passengers will pay at the same rate of 2 cents per mile, instead of one paying almost twice the rate per mile as the other.

"The effect of the changes in fare under the new system will be in some cases to increase and in others to decrease the present fares, while in still other cases no change will be made.

"The new system, it has long been recognized, would do away with discriminations existing under the nickel zone system, but the practical objections to computing fares in odd cents have made interurban officials slow to adopt the copper zone system.

"The officials of the Union Traction Company believe that the new fares will carry out one of the chief objects of the Public Service Commission law—that of eliminating discriminations—and will be generally approved by the public."

The order of the commission in this case was referred to in the Electric Railway Journal of Nov. 28, page 1221.

"AN 1894 NICKEL"

Under the caption "An 1894 Nickel" the Georgia Railway & Power Company, Atlanta, Ga., carried the following 3½-in. x 4½-in. advertisement in the Atlanta papers recently:

"Got one in your pocket? Look at it. Twenty years of circulation have worn it smooth.

"When that nickel was new it was worth one street car ride in Atlanta.

"Now that it's worn, it still is worth here in Atlanta one street car ride.

"Everything's gone up—except your street car ride.

"That's cheaper—yes, cheaper—than it was when your 1894 nickel was coined. Two decades have brought you better and faster and more comfortable cars, greater transfer privileges, miles and miles of new track lines that didn't exist then. Your 1894 nickel pays your fare in 1914 from College Park to Decatur, or from Decatur to Bolton, or from Bolton to Buckhead, or from Buckhead to East Lake, or from East Lake to Druid Hills, or from Druid Hills to Hapeville, or between any two of a score other extremities of the Atlanta system.

"You couldn't be served adequately to-day by Atlanta's street car equipment of twenty or even ten years ago. You'd laugh at the man who tries to convince you that to-day's equipment will suffice ten years from now.

"We've got to keep growing. That's the foundation of one phase of good service. Growth calls for new investment. That must be assured fair return. That's impossible without your good-will. To win your good-will and keep it, we must give good service. The thing's a cycle.

"Would we be so foolish as to break it?"

JAY WALKER SIGNS IN LOUISVILLE

For two weeks preceding Dec. 13 patrons of the Louisville (Ky.) Railway and the Louisville & Interurban Railroad read and re-read signs placed prominently in every car in the service, on which was this text:

WHO WHEN WHY
IS A JAY WALKER?
Safety First
Louisville Safety First Association

The public of Louisville has been more or less interested for several months in the efforts of the Louisville Railway to school it in "safety first" practices, and is co-operating with the company to a considerable degree. This particular sign, however, provoked an unusual amount of discussion because its import was not obvious. The card which succeeded it is now answering the question that was driven home to everybody during the last fortnight. This second card reads:

A JAY WALKER
WHO? Perhaps you.
WHEN? You cross the street at any other place than a regular crossing.
WHY? To save time instead of yourself.
ARE YOU A J-W?

The graphic character of this series, it is believed, has accomplished much in the way of attracting increased attention to and in getting support for the company "safety first" campaign.

"SAFETY FIRST" AT ALLENTOWN

Extensive Efforts Made to Enlist the Co-operation of the Public in This Campaign

The Lehigh Valley Transit Company on Dec. 11 inaugurated a campaign for "safety first" in Allentown, Pa., with the co-operation of the Allentown School Board, the local council for industrial safety and the Chamber of Commerce. Through the courtesy of the management the Lyric Theater, the largest in the city, was secured, and three public meetings were held. The first was at 2:30 p. m., the second at 4:30 p. m. (a special meeting for the public school children and teachers), and the third, a mass meeting, at 8 p. m. Addresses were made by E. M. Young, vice-president of the transit company; E. C. Spring, manager of the Philadelphia division; Mayor C. W. Rinn, E. J. Tumley, president of the Chamber of Commerce; District Attorney S. H. Rupp, G. T. Fonda, safety engineer of the Bethlehem Steel Company; J. W. Haas, president of Muhlenberg College, and Dr. F. D. Patterson, of the Philadelphia department of accident prevention and of The J. G. Brill Company and Harrison Brothers.

At the 4:30 p. m. children's meeting there were 2000 auditors. The illustrated slides and moving picture reels showed how carelessness results in serious accidents. E. M. Young presided at the evening meeting. In his opening remarks he spoke of the changes in transportation methods in recent years and how greater care was necessary by both the employee and the public. He introduced E. C. Spring, who said that in four years the company had carried 100,000,000 people without the death of one passenger by acci-

dent. Mayor Rinn complimented the officials on their efforts. He said that if the 60,000 people of Allentown emulated the employees of the company all accidents would be wiped out. Mr. Tumley said that in one year in the United States 40,000 people were killed and 2,000,000 injured. He said that accident work should be extended to the home. Mr. Fonda stated that the Bethlehem Steel Company had reduced its accidents 60 per cent in the last year by safeguarding employees and educating workmen. Of accidents occurring in industrial plants 80 per cent were due to careless employees and only 20 per cent to non-protected machinery.

Dr. Haas said the safety movement showed a larger human interest, the coming of a better democracy. It was no longer speed first, but care first. Mr. Rupp pointed out that at least five cases had come to his attention in the past year where men were injured or killed through their own carelessness. He showed the economic value of keeping trained employees steadily at their work by giving them the best possible protection. Dr. Patterson proved very adept in driving home the idea of safety first, last and all the time. In the Brill factory the average number of accidents per month had been reduced to thirty. The Pennsylvania Railroad had reduced accidents by 69 per cent. By means of colored slides he illustrated how accidents can easily happen on the street. The moving pictures, "The Workman's Message" and "The Price of Thoughtlessness" were shown on the screen. Another reel showed the difference in damage wrought by an actual head-on collision between two railroad trains made up of antiquated wooden cars and a collision between solid steel trains.

This is the first of a series of meetings which it is proposed to hold in the communities served by the company.

"CAR-FULL" SIGNS AND LIMITED STOP SERVICE IN BOSTON

Limited stop and car-full service has been begun by the Boston (Mass.) Elevated Railway on the Reservoir-Beacon Street and Commonwealth Avenue-Boylston Street subway lines. "Car Full" signs are to be used at the discretion of inspectors during morning rush hours and will be displayed on cars inward bound from Reservoir station upon reaching Coolidge Corner and on inbound Commonwealth Avenue and Brighton cars upon reaching Harvard Avenue, Allston. Such cars will not stop to take passengers until reaching the subway, but will discharge passengers en route. "Limited Stop" signs are to be used during the evening rush hours on outward-bound cars on these lines. Express service will be provided by these cars from the subway incline near Kenmore Street to Harvard Avenue and Corner, respectively, without stops except to receive passengers. In order to accommodate local passengers an additional alternate service will be operated between Park Street subway loop and Coolidge Corner and between Park Street and Oak Square, Brighton, making all regular stops. During both rush-hour periods cars are now scheduled at three-minute intervals between Reservoir station and Park Street in addition to the local line between Coolidge Corner and Park Street, on which a four-minute schedule is maintained. The company has discontinued the use of the term "Express" on passenger car signs, and has substituted the limited-stop sign with destination specified.

Another Elevated Accident in New York.—Seven persons were injured on Dec. 13 in a rear-end collision at 150th Street, New York, between trains of the Manhattan Elevated division, Interborough Rapid Transit Company.

Conductor Convicted of Stealing.—A conductor, charged with petit larceny for pilfering $2.42 from a New York State Railways, Rochester Lines, pay-as-you-enter car, was found guilty in Police Court on Dec. 7. He was ordered to pay a fine of $25, or to serve as many days in the penitentiary. The fine was paid.

Commission to Decide on Augusta-Aiken Fare.—The Railway Commission of South Carolina expected to hold a final hearing on Dec. 16 to decide whether to allow the Augusta & Aiken Railway to increase its passenger rate from 1 cent to 2 cents a mile. If allowed, the order would increase the fare between Augusta and Aiken to 50 cents.

Post-office Appropriation Bill.—It was announced on Dec. 14 that the post-office appropriation bill was virtually completed and ready for submission to the House. The measure includes as a rider the railway mail pay bill, passed by the House and now pending in the Senate, to change the basis of pay from a tonnage to the car space basis used by the mails carried. Approximately $1,000,000 additional compensation would be given the railroads because of the burdens imposed by the parcel post.

City Traffic Committee Proposed.—The transportation committee of the City Council of Toronto, Ont., on Dec. 11 again adopted a report favoring the appointment by the city of a traffic commission and asking that the Board of Control nominate one member for four years, one for three years and one for two years, the commission to investigate the traffic situation of the city and report to Council from time to time the lines of action it deems advisable. The last time the matter was before the Council it was almost unanimously rejected.

Allston Transfer Decision.—The Massachusetts Public Service Commission has issued an order requiring the Boston Elevated Railway to grant free transfers at the intersection of Commonwealth and Harvard Avenues, Allston, to enable passengers to ride inward bound from that point into Brookline Village and thence into Boston, and to transfer from outward-bound Harvard Avenue cars to outward-bound Commonwealth Avenue cars, the privilege not applying to passengers boarding the former cars in the subway on account of the service of the latter on that portion of the system.

Air Reservoir Explosion in New York.—The air reservoir on a Third Avenue Railway car exploded on Dec. 14 without causing any personal injuries and involving only insignificant damage. The reservoir had welded joints throughout, and indications pointed to an initial failure of the longitudinal seam on account of insufficient welded area, the sheet tearing loose from the drumheads over the major part of the joints. The heads remained intact and were not separated completely from the sheet forming the drum so that no metal was thrown by the explosion. Even the pipe connection on one drumhead was left in place.

"Safety First" Zones in Louisville.—Experiments with "safety first" zones at the busy downtown corners in Louisville, Ky., have been so successful that the city police department has established them at all the important corners where streets in the retail section are narrow. The traffic regulations require vehicles of all descriptions to stop at the standards between the tracks and the curb or at the white lines which are painted on the pavement to indicate the limits of the safety zone. The first arrest for disregard of the limits defined by the traffic police was made after the system had been in operation for several months.

Ruling Regarding Trains of Steel and Wooden Cars.—The Long Island Railroad recently petitioned the Public Service Commission for the First District of New York for a modification of the commission's order requiring it, on Dec. 1, 1914, to discontinue the use of wooden cars in trains made up in part of steel cars. The company stated that it had only fifty-three wooden cars in use on the Atlantic Avenue Division, and that these would be retired as soon as new cars could be purchased; but that owing to the financial conditions the company had not yet been able to place its order for the new cars. The commission denied the request for modification.

Ordinance to Free Tracks of Wagons.—At the suggestion of Alderman Capitan the local transportation committee of the Chicago City Council is considering the preparation of an ordinance prohibiting wagons from using the street railway tracks during the Chicago rush-hour periods. In this connection some interesting figures showing delays for the first ten days in December were furnished by J. E. Wilkie, assistant to the president of the Chicago Surface Lines. During this period 100 breakdowns occurred causing an average delay to cars of ten minutes each, and each ten-minute delay meant the holding up an average of ten other cars. Practically all of these delays were accounted for as being due to simple breakdowns in wagons. The territory included in these delay figures was confined only to the Chicago business district.

Employees' Association in Wichita.—An employees' benefit association has recently been organized among the employees of the Wichita Railroad & Light Company, Wichita,

Kan. The operation of the association is governed by nine trustees, six selected by the men and three from officers of the company. There are about 150 members. The assessments are 30 cents a month for each member, and the company pays into the treasury an amount similar to that collected among the members. Benefits of $8 a week are paid after the first week of sickness. The maximum sick allowance is fourteen weeks in any one year. The officers act without pay with the exception of the secretary, who receives a salary of $50 a year. Officers and trustees are elected for a year. The trustees meet once a month. General meetings of all of the members are held three times a year.

Fare Changes on Hudson Valley Railway.—The Hudson Valley Railway, Glens Falls, N. Y., has filed with the Public Service Commission of the Second District of New York effective on Jan. 1, 1915, the following changes in fare: Local one-way fares between stations and stops; Through fare between Saratoga Terminal and Ballston Spa, via Hamilton Street (Saratoga), increased from 10 cents to 15 cents, and sub-zones increased from two to three; limited as follows: Saratoga to Geyser's; Geyser's to Gray's Crossing; Gray's Crossing to Ballston Spa; fare between any two points within a sub-zone 5 cents. Through fare between Thomson and Greenwich increased from 10 cents to 15 cents, and sub-zones increased from two to three; limited as follows: Thomson to Trionda Mill Stop; Trionda Mill Stop to Power House No. 2; Power House No. 2 to Greenwich; fare between any two points within a sub-zone 5 cents.

Inquiry Into New York Elevated Accident.—A public inquiry into the fatal accident of Dec. 9 on the elevated railroad in New York was held by the Public Service Commission, First District, on Dec. 16. C. W. Welder, electrical engineer of the commission, stated that there had been thirty-seven collisions on the New York elevated lines since 1908. Two of these resulted in fatalities to passengers. During this time 2,000,000,000 passengers had been carried. He announced that a new speed-control device was under consideration by the commission which would provide safety without limiting the capacity of the lines as would block signals. Frank Hedley, vice-president of the Interborough Rapid Transit Company, testified that steel cars could not be built light enough for use on the elevated lines without rebuilding the structure, the weight of the present wooden motor car being 58,440 lb. He outlined a new device which he had just conceived for short-circuiting the third-rail shoes and the rails in case of accident to insure the blowing of the circuit breakers. This would prevent fires in wooden cars. The accident was caused by failure of the conductor to ride the front platform of the train and signal to the motorman, who was in the fourth car owing to electrical trouble in the front half of the train.

Pennsylvania Commission Rules on Fares.—The Public Service Commission of Pennsylvania, in a decision made public on Dec. 12 in the case of the Pennsylvania, the Philadelphia & Reading and the Baltimore & Ohio Railroads, which a month ago prepared new tariffs effective on Dec. 15, approved certain of the new rates. The commission ordered the continuance of the fifty and 100-trip commutation tickets, but established a fixed rate of not more than 1½ cents a mile as a maximum rate. This allows an advance over the old rate, the old rate on the 100-trip ticket having been approximately 1 cent. The commission also ruled that the sixty-trip monthly ticket and the forty-trip school ticket shall be valid for a period of one month from date of sale, instead of one calendar month, as the railroads proposed, and that the 180-trip commutation ticket shall be valid for three full months from time of issue. In only one particular are the railroads restrained from putting a higher passenger rate into effect, and that is the charge of 2¼ cents a mile on the ten-trip tickets. The commission ruled that the companies shall sell a ten-trip family ticket, on which ten persons can ride at the same time, for a rate no higher than 2 cents a mile. The railroads are permitted to increase the sixty-trip monthly tickets 25 cents each, but must make the ticket good for one full month from the date of sale, instead of only a calendar month. The railroads are allowed also to increase the forty-six-trip school ticket 20 cents each, but they likewise must be good one month from date of sale.

Personal Mention

Mr. Victor S. Curtis has been elected secretary of the Connecticut Company with headquarters at New Haven, Conn.

Mr. W. P. Hendricks, superintendent and master mechanic of the Elgin & Belvidere Electric Company, Marengo, Ill., has resigned to engage in other work.

Mr. H. L. Moss, formerly electrical engineer of the Elgin & Belvidere Electric Company, Marengo, Ill., has been appointed acting superintendent to succeed Mr. W. P. Hendricks, resigned.

Mr. E. C. Clark, the retiring superintendent of the Northampton (Mass.) Street Railway, was tendered a dinner at the Draper Hotel, Northampton, on Dec. 9 and presented with a mahogany clock by the employees as a token of esteem.

Mr. Peter Witt, street railway commissioner at Cleveland, Ohio, has announced his candidacy for the office of Mayor to succeed Mr. Newton D. Baker, who will not seek office again. Mr. Witt served as city clerk for a long period while the late Tom L. Johnson was Mayor.

Mr. J. Stanley Moore, until recently passenger agent of the Empire United Railways, Syracuse, N. Y., has been named by Governor-Elect Whitman as his military secretary with the rank of major. Mr. Moore was born in Syracuse in 1870 and was graduated from Yale in 1893.

Mr. Ivy Ledbetter Lee has resigned as executive assistant of the Pennsylvania Railroad to become a member of the personal staff of Mr. John D. Rockefeller, New York, N. Y., and will take up the duties of Mr. Jerome D. Greene, who in future will devote his entire time to the Rockefeller Foundation.

Mr. John H. Roemer, chairman of the Railroad Commission of Wisconsin, will, on Feb. 1, 1915, join the organization of H. M. Byllesby & Company, Chicago, Ill., in charge of the extensive legal business of that organization and its allied interests. Mr. Roemer has served on the Wisconsin Commission since the time its duties were enlarged to embrace the regulation of utilities other than steam railways in 1907.

Mr. J. J. Scovern, who has been appointed editor of the *H. & M. Review*, which is to be devoted to affairs of the Hudson & Manhattan Railroad, New York. N. Y., began his railroad career in 1902 as chief clerk to the assistant chief engineer of the Erie Railroad. In 1907 he was made chief clerk of the grade commission bureau of the company. From 1909 up to the present time he has been connected with the Hudson & Manhattan Railroad, holding the positions of secretary of the discipline board, secretary of the general safety committee and secretary of the Hudson & Manhattan Railroad Athletic Association.

Mr. E. E. Eysenbach has resigned as general manager of the San Antonio (Tex.) Traction Company and of the San Antonio Gas & Electric Company to devote attention to his own private interests in Oklahoma. Mr. Eysenbach was formerly vice-president and manager of the Consolidated Gas Company of New Jersey, Long Branch, a consolidation of the Long Branch Gas Light Company and the Long Branch Electric Light Company. His duties at San Antonio will be taken over temporarily by Mr. W. B. Tuttle, vice-president of the companies. Before Mr. Eysenbach left San Antonio he was waited on by a committee of the employees, with Mr. Fred Johnston, claim agent of the company, as chairman, and presented with a silver coffee service from the men as a token of their esteem.

Mr. Charles H. Armatage, formerly traffic manager of the United Traction Company, Albany, N. Y., has been appointed first deputy fiscal supervisor of State charities, succeeding Mr. Charles E. Weisz, who resigned on Dec. 1. Mr. Armatage is a prominent Mason and trustee of the Masonic Home at Utica. For six and one-half years he was superintendent of the Albany County almshouse. He has been connected prominently with several interests in Albany other than the United Traction Company. From 1892 to 1894 he was president of the Common Council of Albany. From 1904 to 1906 he was vice-president and general manager of the William E. Drislane Company, grocers. He was affiliated

with the United Traction Company for fourteen years. Mr. Armatage's railroad experience also includes terms of service with the West Shore Railroad as assistant superintendent of the Buffalo division and with the New York Central & Hudson River Railroad.

Mr. Horace P. Leiper has been named by officials of the Union Traction Company of Indiana to succeed Mr. L. C. Bewsey as superintendent of the Indianapolis division of the company. Mr. Leiper has lately been a conductor on the Muncie division of the Union Traction Company. He has been connected with the company for thirteen years, serving in the operating department of the Logansport and Muncie divisions. He was born in Franklin, Ind., in 1879. Before entering the service of the Union Traction Company he was employed by the Indianapolis Street Railway, which has been succeeded by the Indianapolis Traction & Terminal Company. The men employed on the Indianapolis division of the Union Traction Company have presented Mr. Bewsey with a diamond ring in appreciation of his courtesy to them while superintendent of the division. As previously announced in the ELECTRIC RAILWAY JOURNAL, Mr. Bewsey has become connected with the Buffalo, Lockport & Rochester Railway as superintendent of transportation.

Mr. D. F. Sherman has resigned as vice-president and as a member of the board of directors of the Rhode Island Company, Providence, R. I. While Mr. Sherman is a member of the bondholders' protective committee of the Birmingham, Ensley & Bessemer Railroad, Birmingham, Ala., now in the hands of a receiver, he has no intention of taking up railroad or other business, but is planning to spend the later winter months in California with Mrs. Sherman and hopes to be out of active business for a time at least. Before being elected vice-president of the Rhode Island Company on July 1, 1911, Mr. Sherman was president of the Providence & Danielson Railroad and the Sea View Railroad, both of which later became a part of the system of the Rhode Island Company. About a year ago, at the time the New York, New Haven & Hartford Railroad, the parent company, was involved in the federal investigation and it became apparent that the electric railways would have to be segregated, Mr. Sherman tendered his resignation as vice-president of the Rhode Island Compay, but it was not accepted. He remained with the company and helped in the reorganization work that followed. This fall when the Rhode Island Company's stock, which was held by the New Haven, was turned over to the trustees to be sold, Mr. Sherman was one of the directors who resigned. Mr. Sherman was born near Indianapolis, Ind. He entered a bank at Kankakee, Ill., as a messenger. A number of years later he became cashier of a bank in Montana and aided in developing the bituminous coal mines in the Rocky Mountains. He next located in Portland, Ore., where he spent fifteen years in the banking business, becoming vice-president of one of the banks there. While in southern California in 1900 Mr. Sherman became interested in the plan for the construction of the Providence & Danielson Railway, assisted in financing the line and later took up residence in Providence.

OBITUARY

Richard Henry Bennett, superintendent of equipment of the Union Street Railway, New Bedford, Mass., died in that city suddenly on Dec. 8. Mr. Bennett was born in New Bedford on Jan. 27, 1873, and was graduated from the New Bedford High School. Shortly after leaving school he entered the employ of the Union Street Railway and was advanced through various positions with the company, finally being appointed superintendent of equipment.

Col. Edward Daniel Meier, past president of the American Society of Mecahnical Engineers, veteran of the Civil War, and one of the most eminent mechanical engineers of the country, died in New York on Dec. 16. Col. Meier was born in St. Louis, Mo., on May 30, 1841. At the close of a scientific course at Washington University, St. Louis, he spent four years in Germany at the Royal Polytechnic College in Hanover. In 1884 he organized the Heine Safety Boiler Company for the development in the United States of the water-tube boiler of that name, and was president and chief engineer of the company from its formation up to the time of his death. He was also responsible for the introduction of the Diesel motor into the United States and until 1908 was an officer of the American Diesel Engine Company.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Ozark Valley Railroad, Cascade, Mo.**—Chartered in Missouri to build a 35-mile interurban railway between Cascade and Williamsville. Capital stock, $350,000. Incorporators: Orah D. Ridgely and J. T. Long, Kansas City; James K. Cochran, Pana, Ill.; James H. Downes, Assumption, Ill., and G. A. Long, Kenner, Mo.

***Cleveland, Canton & Akron Railway, Cleveland, Ohio.**—Incorporated in Ohio to build a four-track subway under Fifty-fifth Street between the lake front and Kingsbury Run in Cleveland. Capital stock, $10,000. Incorporators: W. W. White, Thomas H. Garry, James McSweeney, W. M. Connelly and W. B. Snavely.

***Washington Boulevard Street Railroad, Cleveland Heights, Ohio.**—Charter in Ohio to build an electric railway in Cleveland Heights. Capital stock, $10,000. Incorporators: J. C. Lowe, F. C. Work, V. E. Davis, R. F. Allen and H. W. Downing.

FRANCHISES

Argenta, Ark.—The Argenta Railway has received a franchise from the Council to extend its Washington Avenue line east on Washington Avenue and north on Beech Street to the Rock Island station in Little Rock.

Los Angeles, Cal.—The Pacific Electric Railway has asked the Council for permission to abandon its line on Mountain Avenue, now Avenue Sixty-four, from a point north of the former city limits at Meridian Street in Los Angeles.

Los Angeles, Cal.—The City Council of Los Angeles has voted to advertise for sale the proposed franchise for an electric line for Malabar District, on Boyle Heights, in accordance with the amended route. Bond was fixed at $2,500, and bids will be opened on Dec. 21.

***Los Angeles, Cal.**—The City Council has been asked to offer for sale to the highest bidder a twenty-one-year franchise to build an electric railway along certain portions of Brooklyn Avenue, Wabash Avenue and Evergreen Avenue in Los Angeles.

Pasadena, Cal.—The Pacific Electric Railway has received a thirty-year franchise from the Council for a double-track line on North Lake Avenue between Colorado Street and Washington Street in Pasadena.

***Tarpon Springs, Fla.**—The Pinellas Electric Light & Power Company has asked the Council for a franchise to operate an interurban electric railway in Tarpon Springs.

Chicago, Ill.—The Chicago City Council has been asked to grant a franchise for an extension of the Chicago Avenue line from North Clark Street to the lake shore in Chicago. Alderman Geiger offered the consent of the Lincoln Park Commissioners to have the line pass through park property.

Milwaukie, Ore.—The Portland & Oregon City Railroad has received a twenty-five-year franchise from the Council to build a line through Milwaukie from the south on Elmer Street and use Elmer Street to Washington Street, on Washington Street to Twenty-ninth Street and thence north to the city limits.

Portland, Ore.—The United Railways Company has petitioned the City Council to grant a relinquishment of that portion of its franchise on Stark Street west of Tenth Street and from the terminal yards in North Portland to the city limits. This section of track will be useless to the company in the near future by reason of the revocation of its franchise on the Linnton Road by the Multnomah County Commissioners, which takes effect on Feb. 1, 1915. The proposition may mean readjustment in this city of the entire interurban railway system of the Hill interests, which own both the United Railways and the Oregon Electric Railway. The Council has the proposition under advisement. It is said that an effort may be made to have the company give up its line on Stark Street entirely, as many of the property-owners on that thoroughfare are opposed to an interurban line.

TRACK AND ROADWAY

Florence & Huntsville Interurban Railway, Florence, Ala.—Right-of-way is being secured by this company for its line from Florence to Huntsville. Thurston H. Allen, president. [E. R. J., Nov. 21, '14.]

***Calico Rock, Ark.**—Plans are being considered to build an electric railway between Hoxie and Calico Rock. S. J. Johnson, Calico Rock, and associates are interested.

Little Rock, Pine Bluff & Eastern Traction Company, Little Rock, Ark.—Plans are being considered by this company to purchase its power from the Pine Bluff Company. This is part of a plan to build an electric line to connect Little Rock, Altheimer, Stuttgart, Helena and Pine Bluff. C. C. Kavanaugh, Little Rock, president. [E. R. J., Jan. 31, '14.]

Benicia Land & Terminal Company, Benicia, Cal.—Bids have been received for part of the construction work of the proposed Benicia-Vallejo electric railroad, according to a statement of J. J. Henry, representing the A. D. Bowen Company, of San Francisco. The proposed franchise for the line within the Vallejo city limits is in the hands of City Attorney O'Donnell and will be finally acted on about Dec. 30. The Benicia franchise was granted two months ago and the promoters say everything will soon be in shape to start the construction work. [E. R. J., Oct. 5, '14.]

Glendale & Montrose Railway, Glendale, Cal.—During the next two weeks this company will award contracts to build 2.3 miles of new track between the cities of Glendale and Eagle Rock.

Pacific Electric Railway, Los Angeles, Cal.—Work has been begun by this company lowering the tracks in D Street north from Base Line to Highland Avenue, in the city of San Bernardino.

Sacramento Valley Electric Railway, Sacramento, Cal.—G. W. Pierce, president of this company, announces that the construction of the second unit of this railway, from Dixon to Woodland, will begin as soon as financial and right-of-way arrangements are completed. Surveys are now being made on three proposed routes. The reports regarding three available rights-of-way are expected to be presented to the Supervisors within the next two weeks.

San Francisco (Cal.) Municipal Railway.—M. M. O'Shaughnessy, city engineer, has been directed to prepare plans and specifications for the proposed line of this municipal railway through Golden Gate Park to the Sunset District. The Supervisors have unanimously adopted a resolution to that effect. The line will be routed through the park from the present terminus of the railway at Tenth Avenue and Fulton Street and will extend back of the Museum and around Strawberry Hill. The cars will emerge at Fourteenth Avenue and continue to Kirkham Street.

Middletown & Chester Railway, Middletown, Conn.—Plans are being considered to build this line along the river bank through the towns of Chester, Shailerville, Haddam, Durham, Higganum and Middletown. It will connect at Chester with the Shore Line Electric Railway and in South Farms with the tracks of the Connecticut Company. Richard H. Bunce is interested. [E. R. J., Dec. 12, '14.]

***Torrington (Conn.) Traction Company.**—Preliminary arrangements are being made by this company to apply for a charter in January, 1915, to build an interurban line between Torrington and Thomaston to be operated by electric power or any other power than steam. Among those interested are: Hosea Mann, George B. Goodwin and Howard Guernsey.

Waterbury & Milldale Tramway, Waterbury, Conn.—This company has completed its entire line between Milldale and Waterbury, 8 miles.

***Willimantic & Manchester Street Railway, Willimantic, Conn.**—T. J. Spellacy, Hartford, and associates are reported as stating that they will petition the incoming General Assembly for the incorporation of this railway. The company will ask for a franchise for the construction of an electric railway from Willimantic through Columbia, Andover, Coventry, Bolton and Manchester.

Central of Florida Railway, Daytona, Fla.—Between 5 and 6 miles of new track will be built by this company during 1915.

Caldwell (Idaho) Traction Company.—Plans are being contemplated by this company to electrify about 1 mile of steam railroad between Caldwell and Wilder during 1915.

Lee County Central Electric Railway, Amboy, Ill.—During 1915 this company plans to build a 12-mile line between Middleburg and Rochelle.

Alton & Eastern Electric Railway, Alton, Ill.—Arrangements are being made by this company to build soon the extension of the Alton Street line from Alton to the new hospital east of Alton. T. W. Gregory, East St. Louis, secretary. [E. R. J., Feb. 15, '13.]

Joliet & Eastern Traction Company, Joliet, Ill.—An 18-mile extension between Charles City and the Great Western Railway will be built by this company during 1915.

Erlanger, Ky.—Extension of the Fort Mitchell electric line along the side of the Lexington Pike to Erlanger is a project which the Erlanger Improvement League, the Retail Merchants' Association and the Covington Industrial League have under consideration with the County Commissioners. It is proposed to build a single-track line and efforts are being made by these several organizations to get the right-of-way. David Castlemen, J. P. Rife and Samuel Adams are the local committeemen who are pushing the project.

Kentucky Utilities Company, Somerset, Ky.—Extension of the electric railway line from Somerset to Burnside, also in Pulaski County and about 7 miles due south, is said to be an improvement which it is proposed to make out of the funds realized by this company from the sale of its recently authorized $3,000,000 bond issue.

Orleans-Kenner Electric Railway, New Orleans, La.—The Metairie loop will be built by this company in New Orleans. The route over which the extension will come into the city has not yet been agreed upon. [E. R. J., Oct. 5, '14.]

Boston (Mass.) Elevated Railway.—Three new lines for Brookline are being planned by this company. The plans call for a line from Allston Street down Harvard Street to Dudley Street on a ten-minute headway for normal hours and on shorter time for the rush hours; another line from Cypress Street down Huntington Avenue to Park Street, and another from Cypress Street through Brookline Village down Brookline Avenue and Longwood Avenue to North Station.

Springfield (Mass.) Street Railway.—Rapid progress is being made by this company in the construction of the new line in East Main Street in Springfield.

Worcester (Mass.) Consolidated Street Railway.—Plans are being considered by this company for its branch line to Sandersdale.

***Adrian, Mich.**—Plans are being considered for an electric railway from Adrian to Elkhart.

Detroit (Mich.) United Railway.—This company is asked to consider plans to extend its tracks on the western city limits at Webb Avenue to Palmer Park in Detroit.

Menominee & Marinette Light & Traction Company, Menominee, Mich.—About 1½ miles of new track will be built by this company in Menominee during 1915.

***Trans-Michigan Railway, Muskegon, Mich.**—Right-of-way has been secured, franchises voted and options have been secured for terminal properties by this company for its proposed line between Muskegon and Saginaw.

Fallon (Nev.) Electric Railway.—Plans are being made by this company to push the work on the grade to Sand Springs. About 12 miles of the grade has been completed. The Berney Construction Company has taken the contract to complete the grade to Sand Springs and to build all bridges and culverts.

Omaha & Council Bluffs Street Railway, Omaha, Neb.—This company has placed in operation its Center Street line to the southwest section of Omaha.

***Trenton, N. J.**—Right-of-way is being secured to build an electric railway from Trenton to Washington's Crossing and Lambertville. Among those interested are: Joseph H. Moore, Horace G. Hough, Barton T. Fell and George W. McGuire.

Batavia (N. Y.) Traction Company.—Estimates are being secured and plans made by this company for a 3-mile line from Batavia to Horseshoe Lake. The line will connect with the Batavia Street Railway at its eastern terminus.

Buffalo & Depew Railway, Buffalo, N. Y.—Plans are being considered by this company for an extension east from Depew to Crittenden, 6 miles. A ½-mile extension to Lancaster will be constructed during 1915.

Interborough Rapid Transit Company, New York, N. Y.—The Public Service Commission, First District, has disapproved the contract submitted by the Interborough Rapid Transit Company for the construction of the dual system extensions of the elevated railroads in Manhattan and The Bronx. This contract the company proposed to give without competitive bidding to T. A. Gillespie Company, Snare & Triest and Terry & Tench, the contractors now doing the third-tracking work on the elevated railroads for the company. Instead of a lump sum they were to be paid cost plus 12½ per cent. The commission decided that the company may allow the contractors doing the third-tracking work to build connections with the new lines, but that the main parts of the elevated extensions should be awarded as a separate contract after the company had secured bids thereon from at least six different contractors.

Manhattan & Queens Traction Corporation, New York, N. Y.—This company is asked to consider plans to extend its line now running between Long Island City and Jamaica to St. Albans. It is planned to extend the line along Archer Place in Jamaica, to Washington Street, where the company could connect with the other electric lines extending north and south, east and west in Jamaica.

Shelby (N. C.) Northern Railway.—Preliminary arrangements are being made by this company but no definite plans have been decided upon as to when construction will be begun on its 21-mile line to connect Shelby, Spurlinville, Costners, Beams Mill, Fallston, Boggs, Belwood, Warlicks and Casar. The company will furnish power for lighting purposes. Capital stock, authorized, $400,000. Officers: S. S. Royster, Shelby, president, and Orlando Elam, Shelby, secretary.

Chillicothe Electric Light & Power Company, Chillicothe, Ohio.—This company has been repairing its track on Main Street as far as Brownell Street in Chillicothe. The old track has been taken out and new ties have been placed on a foundation of cement.

Cincinnati (Ohio) Traction Company.—An agreement has been reached between the city of Cincinnati and the Cincinnati Traction Company for extensions of various lengths on the following lines: Vine-Clifton, Warsaw-Elberon (main line now under construction), Sixth Street, Vine Street and Clifton-Elm. The electric railway committee has advised against the construction of tracks on Plum Street between Fourth Street and Eighth Street and Central Avenue between Freeman Avenue and Mohawk Bridge. The construction of the Bond Hill line will go forward as rapidly as possible. Agreements were also reached regarding transfers on certain lines. The extensions are in line with the plan of rerouting made some time ago. A new crosstown line north of the present line on McMillen Street is under consideration.

Cleveland (Ohio) Railway.—Plans are being considered by this company for an extension along Euclid Avenue between East Twenty-second Street and East Fortieth Street in Cleveland. Plans to secure an extension of the Buckeye line from East 116th Street to East 130th Street in Cleveland, are being contemplated.

Cushing (Okla.) Traction Company.—Rapid progress is being made by this company on its line from Cushing in an easterly direction through the oil fields. It is planned to purchase power from the Cushing Electric Light & Power Company. Frank Brown, Independence, president. [E. R. J., Nov. 21, '14.]

***Oklahoma City, Okla.**—H. S. Shelor, president of the Chamber of Commerce, and associates are considering plans to build an electric railway to connect Oklahoma City, Okmulgee and Muskogee. Preliminary surveys have been made.

Peterborough (Ont.) Radial Railway.—Within the next few months this company plans to build 1 mile of new track in Peterborough. All material is now on had.

Sarnia (Ont.) Street Railway, Ltd.—During the next few months this company plans to build about ½ mile of new track in Sarnia.

***Toronto, Ont.**—E. A. Wallberg, 10 Adelaide Street E., owner and engineer, is negotiating with the City Council for permission to build an electric line 4½ miles long, from Leaside to Merton Avenue, North Toronto. The owner will buy all material and will superintend construction. Estimated cost of line $200,000.

Sudbury, Ont.—The Board of Railway Commissioners has authorized the Sudbury-Copper Cliff Suburban Electric Railway to build its tracks across the Canadian Pacific Railway in Sudbury, and across various spur lines and the Canadian Pacific Railway Stobie branch. J. H. Mackey, Sudbury, president. [E. R. J., Nov. 7, '14.]

Rhode Island Company, Providence, R. I.—This company is asked to consider plans to extend its North Main Street tracks to the terminus of this highway at the state line, near St. Paul's Cemetery in Woonsocket.

***Beaumont, Tex.**—Initial steps are being taken to build an electric railway between Houston and Beaumont, via Liberty, Dayton and Crosby. Edward Kennedy and associates are promoting the project.

Brenham, Tex.—At a recent mass meeting in Brenham the plans of L. M. Hewitt, promoter for a 15-mile electric line to connect Brenham, Independence, William Penn and Bryan were accepted. A bonus of $35,000 was asked from the citizens of Brenham, with an additional $50,000 worth of stock in the company. [E. R. J., Nov. 21, '14.]

San Antonio (Tex.) Traction Company.—Work has been begun by this company double-tracking North Flores Street in San Antonio.

SHOPS AND BUILDINGS

Birmingham Railway, Light & Power Company, Birmingham, Ala.—Plans are being made by this company to occupy its new building at First Avenue and Twenty-first Street in Birmingham by Jan. 1.

Glendale & Montrose Railway, Glendale, Cal.—During the next two weeks this company plans to award contracts to build a new carhouse. The structure will be 30 ft. x 120 ft. and will be fully equipped for repairing, etc.

San Francisco (Cal.) Municipal Railway.—The Board of Works has awarded the contract for the construction of the municipal railway carhouse on Seventeenth Street to the Clinton Fireproof Company for $195,900.

Norton & Taunton Street Railway, Norton, Mass.—This company's carhouse at Norton Center was destroyed by fire on Dec. 10. The loss is estimated to be about $50,000.

Mansfield Railway, Light & Power Company, Mansfield, Ohio.—This company is building a new interurban office and waiting station in Mansfield. The cost is estimated to be about $20,000.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesburg, Pa.—This company is building a new passenger station at Kauffmans.

Columbia (S. C.) Street Railway.—Plans are being made by this company to rebuild its carhouse in Columbia. The cost is estimated to be about $30,000.

Wellsburg, Bethany & Washington Street Railway, Bethany, W. Va.—This company plans to build soon a new carhouse at Bethany.

POWER HOUSES AND SUBSTATIONS

United Traction Company, Albany, N. Y.—Work will be begun at once by this company on the construction of its new transformer station at the corner of Sheridan Avenue and Chapel Street in Albany. The contract for the building has recently been awarded to the Hunkin-Conkey Construction Company, Cleveland, Ohio. The structure will be 60 ft. x 85 ft. and 45 ft. high, except in the center, where the height will be increased to 62 ft. It is estimated that the cost will be about $40,000. In addition to the building the company will spend $55,000 on machinery, copper and underground cable.

Westmoreland County Railway, Pittsburgh, Pa.—This company is scrapping the equipment in its old power house and will buy its power in the future.

Monongahela Valley Traction Company, Fairmont, W. Va.—The new gas-driven power plant of this company at Hutchinson, midway between Fairmont and Clarksburg, W. Va., is nearing completion. Its total cost will be about $350,000. It will be used to supplement the steam plant from which power has been furnished for the line.

Manufactures and Supplies

ROLLING STOCK

Detroit (Mich.) United Railway, according to an unconfirmed report, is expecting to purchase twenty cars shortly.

Glendale & Montrose Railway, Glendale, Cal., expects to purchase one double-truck passenger car, with seating capacity of forty-four to forty-six passengers.

Cushing (Okla.) Traction Company, Cushing, Okla., has just placed an order with the Westinghouse Electric & Mfg. Company for one 50-ton locomotive and two passenger equipments for its new 1500-volt road.

Westmoreland County Railway, Pittsburgh, Pa., has ordered three cars, 42 ft. over all, seating capacity of forty-four, 26-in. wheels, four Westinghouse baby motors from the Cincinnati Car Company.

Los Angeles (Cal.) Railway has ordered from the St. Louis Car Company a car equipment to be placed on exhibition at the Panama-Pacific Exposition which later will go into city service. The equipment is of the low-floor design and is equipped with double Westinghouse No. 306 50-hp motors and light-weight HL pneumatic control.

TRADE NOTES

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has received an order from the Easton (Pa.) Transit Company for one four-motor equipment of No. 306 Westinghouse motors and HL control.

Union Switch & Signal Company, Swissvale, Pa., has appointed H. R. Sheene as sales engineer with headquarters in Room 2039 Railway Exchange Building, St. Louis, Mo., reporting to the resident manager at Chicago.

Mesta Machine Company, Pittsburgh, Pa., has recently acquired the rights from the Stumpf Una-Flow Engine Company, Syracuse, N. Y., to build the Stumpf Una-Flow type of engine in the United States. This company is at present making detailed shop drawings of various sizes of engines for rolling mill purposes. In addition to rolling mill engines, the company will build large units for driving electric generators, air compressors, hoisting engines, etc.

Arthur D. Little, Inc., Boston, Mass., has recently prepared specifications for body, roof and truck paints for electric cars, following studies of the car-painting practice on more than twenty electric railways, which demonstrated the feasibility of reduced painting costs by nearly 50 per cent while cutting time in the shops in half. This company has co-operated with the American Electric Railway Engineering Association in developing specifications for rubber-covered wire and cables and for trolley wire.

Edison Storage Battery Company, Orange, N. J., reports that its storage-battery works, which escaped uninjured by the recent fire which destroyed part of the Edison Phonograph Works on Dec. 9, suffered no interruption whatever to its business. The telephone exchange was in one of the burned buildings, but through the prompt action of the New York Telephone Company a temporary switchboard was working in the battery office before business hours the next morning and the Public Service Electric Company had emergency lines furnishing power about as quickly.

Esterline Company, Indianapolis, Ind., manufacturer of "Golden Glow" headlights, reports shipments of these headlights during the month of November to the following properties: Sioux City (Ia.) Service Company; Virginia Railway & Power Company; Birmingham (Ala.) Railway, Light & Power Company; St. Louis Car Company for Empire United Railway's new cars; Los Angeles (Cal.) Railway; Strickland-Goodwin Management Association; Western Light & Power Company; Northern Texas Traction Company; Michigan Central Railroad; Cincinnati Car Company, for Ephrata & Lebanon Traction Company's new cars; Topeka (Kan.) Railway; Harrisburg (Pa.) Railways; Indiana Railways & Light Company; Iowa Railway & Light Company; American Car Company, for Bryan & College Interurban Railway's new cars; Southwestern Gas & Electric Company; Omaha & Council Bluffs Street Railway; Wausau (Wis.) Street Railway; Lowell & Fitchburg Street Railway; Scranton (Pa.) Railway; Georgia Railway & Power Company; Jackson Railway & Light Company and Altoona & Logan Valley Electric Railway.

ADVERTISING LITERATURE

Stow Manufacturing Company, Binghamton, N. Y., has issued a catalog describing some of its portable tools, including drills and grinders.

Dielectric Manufacturing Company, St. Louis, Mo., has issued Bulletin No. 9, describing "Dielac Black," its spirit finishing varnish, for painting armatures.

Arnold Company, Chicago, Ill., has issued a postal containing an illustration of a substation just completed by this company for the Chesapeake & Ohio Railway.

Ohmer Fare Register Company, Dayton, Ohio, has published a pamphlet describing its fare box for both cash and tickets. The pamphlet also quotes remarks made by railway men at the last convention covering the use of various types of fare boxes.

Asbestos Protected Metal Company, Beaver Falls, Pa., has issued a catalog describing special uses of Asbestosteel, its asbestos protecting metal, in connection with concrete for the construction of roofs and curtain walls. The catalog contains a number of illustrations of applications of this material to various buildings, among them being a view of the interior of the Philadelphia & Garretsford Railway, which uses this type of construction for the roof of its substation. In developing this process sheet steel is protected from corrosion by being covered on both sides with a uniform coating of asphalt, which in turn is protected from fire and weather exposure by a layer of hardened and waterproof pure asbestos felt laid over and imbedded in the asphalt while still hot and soft. This is done without sacrificing the advantages inherent in corrugated sheets for roof and wall constructions. The catalog is designed and written by Ray D. Lillibridge, Inc., New York.

Archbold-Brady Company, Syracuse, N. Y., has issued a booklet on the subject of its steel transmission structures and catenary bridges. In the booklet are presented views of structures covering a wide range of designs and localities. With the idea of showing actual and varied practice, brief descriptions are given to transmission lines using "A" frame towers and narrow base poles, catenary bridges and also anchor towers and structures required for special purposes. The electric railways represented by the illustrations shown include the Puget Sound Traction, Light & Power Company, East St. Louis & Suburban Railway, Fonda, Johnstown & Gloversville Railroad, Northern Ohio Traction & Light Company, Boston & Maine Railroad (Hoosac Tunnel), Empire United Railways, United Traction Company, Albany, N. Y., and Berkshire Street Railway. The "A" frame towers are designed for both pin and suspension type insulators and for conductors of all sizes and materials. The laced channel poles are particularly adapted for lines in rough country. Since they take up little room at the ground line, the poles save expensive right-of-way where land is valuable and on steep side hills the necessity of erecting "benching in" or extension legs for wide base towers is avoided. They can be set interchangeably with concrete bases or with all steel foundation, as may be most suited to the nature of the ground.

NEW PUBLICATIONS

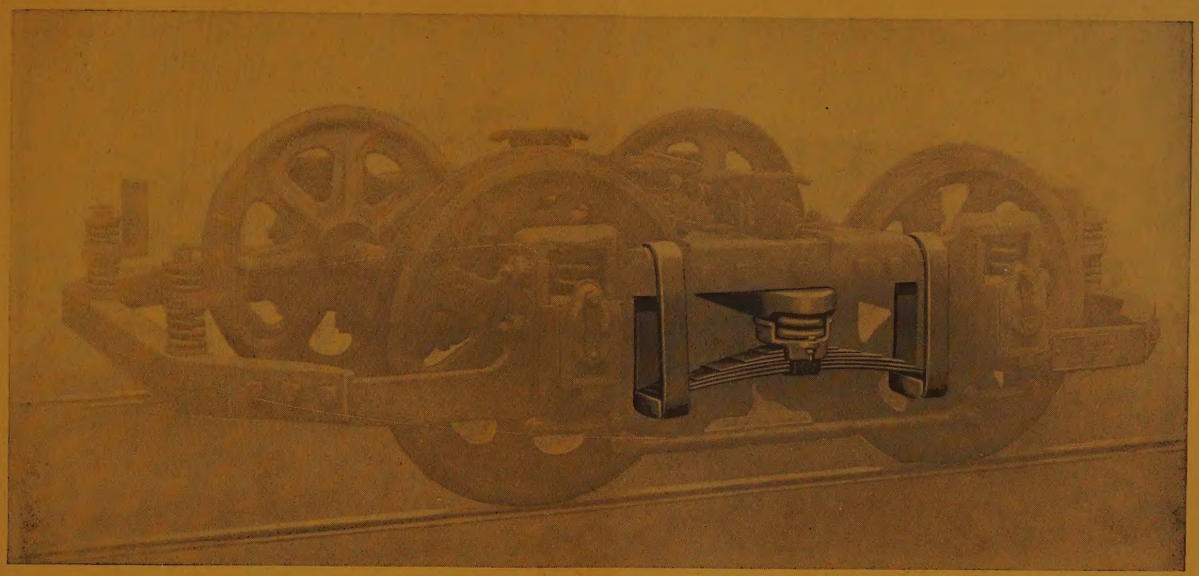
Proceedings of New York State Association for the Fiscal Year Ending June 30, 1914, published by the secretary, Brooklyn, N. Y. 276 pages.

The annual report of the New York Electric Railway Association always contains a great deal of good material, and this volume is no exception to the rule. The conventions reported are the annual meeting at Bluff Point, June 30 and July 1, and the quarterly meeting at New York on Dec. 9, 1913. The volume is not only attractive because of its contents but because of its exceptionally good typographical execution.

Proceedings of Southwestern Electrical & Gas Association for 1913, published by the secretary, Slaughter Building, Dallas, Tex. 145 pages.

The Southwestern Electrical & Gas Association is to be congratulated upon the excellence of its conventions. A note from the secretary states that the papers in the present volume are not printed in full but in abstract, and that the 1914 proceedings will be published within a short time.

BRILL GRADUATED SPRING SYSTEM



TRUCK SPRINGS are made for maximum loads, and it takes the maximum load to get the best action, the smoothest motion to the car, out of them. This means that the springs are too stiff to give easy riding to the lightly loaded car. And yet cars run lightly loaded most of the time. The Brill Graduated Spring System has two kinds of spring action, one for light loads and one for heavy. Of course there is some play of the semi-elliptics, with the bolster coil springs, but it is the coil springs that give the smooth motion to the lightly loaded carbody, because they are quicker and softer in their action; while the semi-elliptics, being friction springs, are slower and therefore suited to cushion the heavier load. By light loads is meant any load up to nearly a full load of seated passengers; above that load the seat castings of the coil springs come in contact with the bolster, and these springs stop acting. The 76-E Truck is shown in the above illustration. The Brill Graduated Spring System is also a standard feature of the 39-E Single-Motor Truck.

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The Chicago, Milwaukee and St. Paul Trans-Continental Electrification

The contract for the complete electrification of the 113-mile engine division between Deer Lodge and Three Forks, Mont., on the main line between Chicago and the Pacific Coast, has been placed with the General Electric Company. The contract covers:

Twelve 260-Ton Locomotives.

17,000 Kilowatts in 3000-Volt Motor Generator Sets, with complete complement of Transformers and Switchboards for installation in four substations.

This equipment is for the heaviest locomotive service ever undertaken, and this road is the first to adopt 3000 volts direct current.

The G. E. high voltage direct current system was adopted after long and careful study. It is an epoch-making event; another General Electric milestone in the history of transportation.

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For Texas, Oklahoma and Arizona business refer to Southwest General Electric Company (formerly Hobson Electric Co.), Dallas, El Paso, Houston and Oklahoma City. For Canadian business refer to Canadian General Electric Company, Ltd., Toronto, Ont.

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